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GOVERNMENT OF INDIA

PLANNING COMMISSION

SECOND FIVE YEAR PLAN

AGRICULTURE

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Explanatory Note

The expression 'lakh' and 'crore' signify 100,000 and 10,00 000 respectively.

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PART III
AGRICULTURE

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CHAPTER XIII

PROGRAMME FOR AGRICULTURE

The first five year plan accorded pride of place to programmes for agriculture and community development. This was a natural priority in a plan seeking to raise the standard of living of the mass of the people, specially in rural areas, but it was also justified in the special circumstances of shortage and inflation which existed when the plan was formulated. More than any other factor, the increase in agricultural production which has taken place since 1952-53 has helped to end inflation, stabilise the economy and prepare the way for a higher rate of development during the second five year plan. The index of agricultural production, with 1949-50 as base, stood at 96 in 1950-51. It stood at 114 in 1953-54 and 1954-55, and is expected to be 115 in 1955-56. During the first plan, the national product increased by 18 per cent, and income in the agricultural sector increased in the same proportion. Increase in agricultural production also stimulated growth in other sectors of the economy.

Review of the first plan

2. The first five year plan envisaged the following increases in agricultural production:—

Commodity	Unit	Production in base year*	Targets of additional production	Percentage increase
Foodgrains	Million tons	54·0	7·6	14
Major oilseeds	„	5·1	0·4	8
Sugarcane (gur)	„	5·6	0·7	13
Cotton	Million bales	2·9	1·3	45
Jute	„	3·3	2·1	64

* Base year for foodgrains is 1949-50 ; for others 1950-51.

These targets of additional production, especially of foodgrains, were worked out in terms of the contribution anticipated from different programmes such as irrigation, use of larger quantities of fertilisers, supply of improved seeds and programmes of land reclamation and development. In other words, it was reckoned that if the developmental measures which the plan provided for were taken the production potential would increase to the extent indicated. In given years the actual levels of production for different

commodities would necessarily vary with weather conditions and other factors such as the relative prices for different crops.

3. The course of agricultural production during the first plan is shown in the following statement:—

Commodity	Unit	1951-52	1952-53	1953-54	1954-55	1955-56 Estimated
Cereals . . .	Million tons	42·9	49·2	58·3	55·3	55·0
Pulses . . .	,,	8·3	9·1	10·4	10·5	10·0
Total foodgrains .	,,	51·2	58·3	68·7	65·8	65·0
Major oilseeds .	,,	4·9	4·7	5·3	5·9	5·5
Sugarcane (gur) .	,,	6·1	5·0	4·4	5·5	5·8
Cotton . .	Million bales	3·1	3·2	3·9	4·3	4·2
Jute	,,	4·7	4·6	3·1	2·9*	4·0

*Partially revised estimate.

It will be seen that during the period of the plan 1953-54 was the year of peak production for foodgrains and 1954-55 for oilseeds and cotton. In the case both of sugarcane and jute 1951-52 was the year of the highest production and although, after a period of decline, production improved towards the end of the plan, the targets which were set were not realised.

4. These trends emerge more clearly from the following statement which sets out the index numbers of agricultural production during the period of the plan for various groups of crops:

(Base : 1949-50=100)

	Weight	1951-52	1952-53	1953-54	1954-55	1955-56 Estimated
I. *Foodgrains*—						
Cereals . .	58·3	91	101	119	112	112
Pulses . .	8·6	90	99	112	113	108
Total foodgrains .	*66·9*	*91*	*101*	*118*	*112*	*111*
II. *Non-foodgrains*—						
Oilseeds . .	9·9	97	92	107	115	108
Cotton . .	2·8	119	121	153	166	162
Jute . .	1·4	151	149	101	102	136
Miscellaneous—						
Sugarcane .	8·7	123	102	90	112	118
Other crops including plantation crops . .	10·0	105	107	105	111	125
Total non-foodgrains	*33·1*	*111*	*104*	*106*	*117*	*122*
All commodities .	*100·0*	*98*	*102*	*114*	*114*	*115*

It is significant that the overall index of agricultural production has been maintained at a fairly high level during the past three years. This has been accompanied by some decline in foodgrains which account for about 67 per cent. of the total value of agricultural production. Trends have to be studied over a longer period before firm conclusions can be established.

5. The fact that agriculture depends on several unpredictable factors and agricultural targets must necessarily be in the nature of a tentative approach is illustrated by the actual statistics of increase in the production of individual foodgrains:—

(million tons.)

	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56 Estimated.
Rice	23·2	20·3	21·0	22·5	27·8	24·2	25·5
Wheat	6·3	6·4	6·1	7·4	7·9	8·5	8·5
Millets (Jowar and Bajra)	8·5	8·0	8·3	10·4	12·4	12·6	12·0
Other cereals . .	8·0	7·0	7·5	8·9	10·2	10·0	9·0
Total cereals . . .	46·0	41·7	42·9	49·2	58·3	55·3	55·0
Gram and pulses . .	8·0	8·3	8·3	9·1	10·4	10·5	10·0
Total foodgrains . .	54·0	50·0	51·2	58·3	68·7	65·8	65·0

Of the increase of 7.6 million tons anticipated over the first five year plan it was thought that roughly rice might account for 4 million tons, wheat for 2 million tons, gram and pulses for a million tons and other cereals for 0.5 million tons. The largest increase has occurred in millets and other cereals and the target for wheat production has been realised. On the whole, the expectation in respect of rice has not been fulfilled except in one specially favourable year. Nevertheless, the increase in food production made possible a reduction in imports from the level of 4·73 million tons in 1950 and 3·86 million tons in 1951 to less than a million tons during each of the past two years. This was a distinct advantage to the general economy of the country.

6. With the data available it would not be correct to attempt to relate too closely the progress of production in individual agricultural commodities to the actual progress made from year to year in implementing the programmes of the first five year plan. In the nature of things many factors operate at the same time. It is proposed that the data bearing on agricultural production, during the

first five year plan, including the results of crop cutting surveys, should be investigated through a number of intensive and specially designed studies. Among the aspects on which more objective knowledge would be of considerable value in the making of policy and in assessing results, the following may be specially mentioned:

(1) production trends in different regions,

(2) effects of agricultural production and extension programmes,

(3) range of influence of favourable and unfavourable conditions,

(4) review of yardsticks of additional production at present in use,

(5) yield trends for the principal crops, and

(6) cost of various agricultural production and extension measures in relation to the benefits realised.

7. From the limited information available it appears that among programmes of development which have contributed to increase in agricultural production during the first plan, minor irrigation works, increased use of fertilisers, land reclamation and development and the extension of area under cultivation have been specially significant. Minor irrigation programmes were being undertaken for several years before the plan. During the period 1943-44 to 1950-51 programmes of the value of about Rs. 62 crores were approved in pursuance of the grow-more-food campaign and a major portion of these were devoted to minor irrigation. During the first plan about 10 million acres of land are expected to have been brought under irrigation from minor works and about 6·3 million acres from large and medium irrigation schemes. More than half the increase in the area benefiting from minor irrigation occurred during the first two years of the plan. Considerable progress has been made in several States, notably, in Bihar, Uttar Pradesh, West Bengal, Punjab, Assam, Bombay, Madras and Mysore. The benefits of irrigation are realised to a greater extent when combined with the use of fertilisers. During the plan period the consumption of ammonium sulphate has more than doubled, from 275,000 tons before the plan began to 610,000 tons four years later. Special attention has been devoted to spreading the use of the 'Japanese method' of rice cultivation, the area brought within its scope so far being about 1.6 million acres.

8. During the first four years of the first five year plan more than one million acres of land were reclaimed through the Central Tractor Organisation and 1·4 million acres through State tractor organisations. Besides this, about 5 million acres have been developed by cultivators through programmes sruch as assistance for mechanised

cultivation, bunding and levelling and reclamation of land by manual labour. The extension of cultivation has been a larger contributory factor towards increase in production than had been anticipated when the plan was drawn up. Thus, the total cropped area has increased from 326 million acres before the plan to 352 million acres in 1954-55. The area under food crops has risen from 257 million to 272 million acres and under commercial crops from 49 million to about 60 million acres. The area under commercial crops has increased from 15 per cent of the total cropped area to 17 per cent, while the area under food crops has diminished from 79 to 77 per cent of the cropped area. The area under other crops (20 million acres) has shown little change.

Approach in the Second Plan

9. During the first five year plan it was of crucial importance that agricultural programmes must succeed, for no other consideration had equal significance for the stability of the economy as a whole. In the second five year plan agricultural programmes are intended to provide adequate food to support the increased population and the raw materials needed for a growing industrial economy and also to make available larger exportable surpluses of agricultural commodities. The second five year plan implies, therefore, even more than the first a close inter-dependence between agricultural and industrial development. While formulating programmes to achieve these objects, it is necessary to take a long-term view so as to secure the best possible use of material and human resources, ensure balanced development between different branches of agriculture and create conditions for an appreciable increase in rural incomes and standards of living. In framing agricultural programmes it is essential, from the national point of view, to place before the villagers a goal which they should strive to attain. In connection with the preparation of the second five year plan it was stated that this goal should be the doubling, within a period of about ten years, of agricultural production, including food crops, oilseeds, cotton, sugar cane, plantation and other crops, animal husbandry products, etc.

10. In relation to the food problem the factors to be considered are: (1) increase in the total population, (2) increase in the urban population, (3) the need to improve *per capita* consumption, (4) the need to counter possibilities of inflationary pressures resulting from the implementation of the second five year plan, and (5) effects on food consumption of increase in national income and changes in its distribution The total food requirements in 1960-61 at the present rate of consumption will be 70·5 million tons. By the end of the

second plan the rate of consumption is estimated to rise to 18·3 ounces per adult (cereals 15·5 ounces and gram and pulses 2·8 ounces), so that the total food requirements will be 75 million tons. The plan provides for increase in food production of 10 million tons over the next five years. In terms of calories the per adult consumption of food per day, which at present amounts to 2200, is expected to increase by 1960-61 to 2450 as against the minimum of 3000 calories recommended by nutrition experts.

11. Compared to many other countries the rate of cereal consumption in India is relatively high. This is because such energy producing foods as milk and milk products, fruit and vegetables, eggs, fish and meat are far from adequately represented in the common diet. Apart from the question of correct food habits, which is undoubtedly a matter of extreme importance, the output of each of these supplementary foods is at present grossly insufficient. During the second five year plan the aim will be to diversify agricultural production and to shift somewhat the emphasis which has been hitherto placed in a dominant degree on the production of cereal crops. The second plan also provides for programmes for increasing the production of crops like arecanut, coconut, lac, black pepper, cashewnut etc. which did not receive sufficient attention during the first plan.

12. The scope for increasing the area under cultivation is extremely limited. Such increase as may take place in the area under cultivation is likely to increase the production mainly of the coarser grains. As national income increases, there may be a general tendency for demand to shift from the coarser to the superior grains, especially to rice, wheat and maize. In the circumstances, the main source of increase in agricultural production must be increase in yields from more intensive, more efficient and more profitable agricultural production. Although the available data are not always comparable, there is little doubt that the average yields of principal crops like wheat and rice in India are considerably smaller than those current in several other countries. The crop cutting experiments which have been conducted in recent years in different parts of the country show large variations in the average yields of crops between different regions and even within each region. Crop competitions which have been carried on for some time past also afford an indication of levels which can be attained in Indian conditions when the necessary effort and assistance are forthcoming. It is now within the bounds of practical action to bring about a rapid and fairly widespread increase in agricultural yields. This requires more detailed and systematic planning in terms of regions, States, districts and project areas such as has not yet been undertaken.

Date drived from crop competitions should be widely publicised, so that each area can set its goals in the light of established facts. To the extent necessary, the scope of crop competitions should be widened. What is required is not merely the encouragement of high levels of achievement on the part of individual farmers, but a more comprehensive effort which would raise the general average in each area. Every part of the country should have targets of average production for different crops based on a broad classification of physical conditions of irrigation, rainfall, terrain, etc. In pursuance of these targets there should be programmes for raising levels of productivity which go down to individual villages and individual families.

13. Despite the uncertainties to which agriculture is necessarily subject, it is important that a more studied effort to introduce a planned approach to agricultural development should be made. The main elements in agricultural planning are:

(1) planning of land use;

(2) determination of targets, both long-term and short-term;

(3) linking up of development programmes and Government assistance to production targets and the land use plan, including allocation of fertilisers etc. according to plan; and

(4) an appropriate price policy.

Each district and, in particular, each national extension and community development project area should have a carefully worked out agricultural plan. This should indicate for villages the targets to be aimed at, the broad distribution of land between different uses and the programme of development. Within the framework of an overall price policy such as has been outlined in an earlier chapter, such local plans will be valuable steps leading to more careful planning for States and regions and for the country as a whole. The crop pattern envisaged by these local plans has in the main to be influenced through such incentives as the provision of irrigation, credit and marketing facilities, provision of fertilisers, and intimate contact with the cultivator on the part of extension workers and especially the village level workers.

14. With the objectives set forth above, the following pattern of outlay for development in the rural sector is proposed for the second five year plan:

Agriculture and Community Development

Head of Development	First Plan		Second Plan	
	Rs. crores	per cent	Rs. crores	per cent
(a) Agricultural programmes :				
1. Agriculture	196	81·7	170	49·9
2. Animal Husbandry	22	9·2	56	16·4
3. Forests & Soil Conservation	10	4·2	47	13·8
4. Fisheries	4	1·6	12	3·5
5. Cooperation including warehousing and marketing	7	2·9	47	13·8
6. Miscellaneous	1	0·4	9	2·6
TOTAL	240	100·0	341	100·0
(b) National Extension and Community projects	90	77·6	200	88·1
(c) Other programmes :				
1. Village Panchayats	11	9·5	12	5·3
2. Local Development Works	15	12·9	15	6·6
TOTAL	116	100	227	100
	356		568	

PRODUCTION TARGETS

15. The principal targets of agricultural production for the second five year plan are set out in the following statement:

Commodity	Unit	Estimated production in 1955-56	Target of additional production	Estimated production in 1960-61	Percentage increase
Foodgrains	million tons	65·0	10·0	75·0	15
Oilseeds	million tons	5·5	1·5	7·0	27
Sugarcaen (gur)	million tons	5·8	1·3	7·1	22
Cotton	million bales	4·2	1·3	5·5	31
Jute	million bales	4·0	1·0	5·0	25
Coconut (oil)	lakh tons	1·3	0·8	2·1	62
Arecanut	lakh maunds	22·0	5·0	27·0	23
Lac	lakh maunds	12·0	4·0	16·0	33
Tobacco	lakh tons	2·5	..	2·5	
Black Paper	thousand tons	26·0	6·0	32·0	23
Cashewnut	thousand tons	60·0	20·0	80·0	33
Tea	million pounds	644·0	56·0	700·0	9

The index numbers represented by these targets are given below: (base 1949-50):—

	1950-51	1955-56	1960-61
Foodgrains	91	111	129
Oil seeds	99	108	137
Sugarcane (gur)	114	118	144
Cotton	106	162	213
Jute	109	136	194
Other crops including plantation crops	105	125	136
Total non-foodgrains	106	122	148
All commodities	96	115	135

These targets are in the nature of first estimates derived from calculations of the production potential expected to be added as a result of various developmental programmes. In view of the considerations outlined in paragraph 10 and especially the need to provide adequate safeguards against possibilities of inflation, it is considered that it is both necessary and possible to achieve higher agricultural targets with relatively small adjustments in regard to resources. In particular, through the national extension service it must be the aim to reach every village and every family and to organise supplies and services and short, medium and long-term finance required for achieving these targets. With a view to fixing higher targets and ensuring their realisation, the Planning Commission and the Ministry of Food and Agriculture propose to undertake further study of agricultural programmes in each State and region with reference to its crop pattern, land and water resources and programmes of development in irrigation, national extension and other fields.

16. *Foodgrains.*—The target for foodgrains has already been referred to earlier. It is expected that of the increase of 10 million tons in foodgrains, rice may account for 3 to 4 million tons, wheat for 2 to 3 million tons, other cereals for 2 to 3 million tons and pulses for about 1·5 to 2 million tons.

17. *Cotton.*—To fulfil the textile targets for the second five year plan, the production of raw cotton has to be raised from 4·2 million bales in 1955-56 to 5·5 million bales in 1960-61. Programmes for the cotton development will continue the measures undertaken during the first five year plan such as provision of hybrid seed, multiplication and distribution of improved seed, grant of loans to cultivators for the purchase of seed and fertiliser and extension and propaganda among the cotton cultivators. An important feature of development under the second plan will be the emphasis on increasing the production of long staple varieties particularly in the areas brought under major irrigation projects. The achievements made so far in increasing the production of long staple varieties have been

significant and the proportion of these varieties had gone up from 17·5 per cent in 1948-49 to about 37 per cent in 1954-55.

18. *Jute.*—Before Partition, India had a virtual monopoly in the production and supply of raw jute, jute being always one of India's principal foreign exchange earners. After Partition only about 19 per cent of the total production of raw jute of undivided India came to the share of the Indian Union. While there has been substantial improvement in the production of jute from 1·7 million bales in 1947-48 to about 4 million bales in 1955-56, much of the additional jute produced in the country during the last few years was grown on marginal lands and was of poor quality, which consequently fetched low prices. The emphasis in the programme for jute production has to be changed from quantity to quality and new jute cultivation has to be undertaken in areas suitable for growing high quality jute. The requirements of the industry for raw jute may be placed at 7·2 million bales if all the mills were to work to full capacity. In addition about 150,000 bales may be treated as extra-factory consumption. It is therefore proposed to provide 5 million bales from internal production and to import the balance. It should be possible to produce the additional quantity of 1 million bales of jute largely through intensive cultivation measures with the ultimate objective of achieving an average yield of 3 bales per acre of good quality jute. The measures proposed in the second plan include the continuation on an expanded basis of the existing jute extension schemes, setting up of seed farms, supply of improved seeds, distribution of seed drills, construction of retting tanks etc. The organization of an extension service for demonstration of improved cultural practices is an important item in the jute development programme.

19. *Oil seeds.*—Oilseeds and vegetable oils besides constituting a source of fat supply in the diet of the population are valuable export commodities. The production of the five major oilseeds—groundnut, sesamum, linseed, rape and mustard and castor seed is expected to go up from 5·1 million tons in 1950-51 to about 5·5 million tons in 1955-56 which was the target fixed under the first plan. Under the second five year plan, it is proposed to increase the production of the five major oilseeds to 7 million tons as shown below:—

	(lakh tons)
Groundnuts	47·00
Sesamum	6·51
Linseed	4·28
Rape & mustard	10·60
Castor	1·61
TOTAL	70·cc

Schemes for the production and distribution of good quality seeds sponsored by the Indian Central Oilseeds Committee during the first plan period have given promising results. It is proposed to popularise these improved seeds on an intensive scale during the second plan. Other schemes included in the plans of states cover application of fertilisers and manures, control of pests and diseases and research for evolving better and new varieties. Arrangements will also be made for improved marketing of oilseeds.

20. In considering the effect of the target of additional oilseeds production on increasing the supply of vegetable fats and vegetable oils, account has to be taken of the production of the other important edible oil, namely, coconut oil, the quantities proposed to be exported, industrial consumption etc. The following table gives the position in respect of the five principal oils as also cotton seed and coconut oils.

(Thousand tons of oil)

	Estimated 1954-55	Estimated 1960-61
Total production	1760	2114
For edible uses	1139	1192
For vanaspati manufacture	259	430
For industrial purposes	224	278
Exports	138	214

This assumes an export target of 5 lakh tons of groundnut and 2 lakh tons of other oils (in terms of seed). Emphasis will also be placed on stepping up the production and export of cotton seed oil and oils from solvent extraction process.

21. *Sugarcane*.—The consumption of sugar and gur has increased steadily during recent years. In 1950-51 under conditions of control about 10·7 lakh tons of sugar were consumed. The amount consumed in 1954-55 was about 17 lakh tons. Under the second plan, it is proposed to raise the production of crystal sugar to 22·5 lakh tons and the installed capacity to 25 lakh tons at the end of 1960-61. In order to make available to sugar factories increased quantities of cane and also to provide for higher gur consumption, additional production of 13 lakh tons of sugarcane in terms of gur, is aimed at. This will raise the total production from 5·8 million tons expected in 1955-56 to 7·1 million tons in 1960-61, the amount available per adult being 1·72 ozs. per day. Schemes for the intensive cultivation of sugarcane include provision of irrigation facilities, establishment of seed nurseries, distribution of disease free and improved varieties of

seeds, distribution of manures and fertilisers, control of pests and diseases, organisation of demonstrations and crop competitions. The main emphasis will be on increasing the sucrose content of the cane and ensuring maximum supplies of cane during the crushing season.

22. *Coconuts.*—India is the second largest coconut growing country in the world, producing as she does about 3800 million nuts a year. Still the country is deficit to the tune of 40,000 tons in terms of coconut oil. This deficit is expected to go up to 80,000 tons in 1960-61 after allowing for the increased population and possible rise in consumption standards. By undertaking both short-term as well as long-term measures, it is proposed to increase the production of coconuts to 210,000 tons in terms of oil by 1960-61 as against 130,000 tons at present. The short-term programme includes the setting up of demonstration centres to propagate improved methods of coconut cultivation including protection of the crop against pests and diseases. Under the long-term programme the area under coconut will be increased by bringing suitable waste lands, development of nurseries for the distribution of superior varieties of plants etc. It is also planned to increase the yield of coconuts from 30 to 45 nuts per tree.

23. *Arecanuts.*—As in the case of coconut, the country is also deficit in the supply of arecanuts, the existing production being 81,000 tons, as compared to the requirements of 118,000 tons at present. After allowing for the increase in population and also a slightly higher rate of consumption at the end of 1960-61, the requirements may be placed at 129,000 tons. But as the arecanut tree takes eight to ten years to bear fruit, extension of area under the crop will yield results only during the third plan period.

However, it is proposed to increase the production of arecanut by about 25 per cent through intensive methods of cultivation and by prevention of pests and diseases, supply of quality seedlings, introduction of improved cultural practices etc. Efforts will be directed towards increasing the yield per acre from an average of 658 lbs. to 820 lbs. The target of production at the end of 1960-61 may be placed at 99,000 tons. The Indian Central Arecanut Committee has already carried out a survey of waste lands suitable for growing arecanuts and it is intended to investigate and exploit these possibilities fully in the course of the second plan.

24. *Lac.*—Lac is the raw material for shellac and seed lac which are important items of export trade. The production of lac during the last few years has varied between 37,000 to 48,000 tons, the expected production in 1955-56 being of the order of 44,000 tons. In formulating the target of additional production, the possibilities of export demand for the commodity as well as competition from lac and from artificial substitutes produced abroad has to be kept

in view. The second five year plan aims at stepping up production to 59,000 tons. Emphasis will also be given to the improvement of quality. These objectives are to be attained mainly through the establishment of regional brood farms in different areas, survey of idle host plant and imparting technical knowledge on lac cultivation. It is proposed to organise a lac extension service in important lac growing areas. In addition, it is also proposed to establish air-conditioned and ordinary godowns for storage of stick lac at important marketing centres.

25. *Tobacco.*—Next to U.S.A. and China, India is the largest tobacco producing country in the world. In 1954-55, 250,000 tons of tobacco were produced. The problem which faces tobacco cultivation is not so much of expansion of production as improvement in quality. Due to unfavourable weather conditions, a large proportion of the crop during recent years turned out to be of low grade varieties and it was found difficult to sell it. This resulted in the accumulation of stocks and consequent fall in prices. Improvement of quality will be given the highest priority in the programme for the second five year plan, and increase in production as such is not envisaged.

•26. *Black Pepper.*—Black pepper is an important dollar earner and has also considerable local importance in Travancore-Cochin, Malabar and South Kanara. In recent years, however, India has been facing increasing competition from other countries. The lines on which pepper development and research should be organized have been recommended by a special committee. The scheme was started in 1954-55 and is proposed to be intensified during the second five year plan. The objective under the plan is to raise the area under pepper cultivation by about 50,000 acres and to increase production from 26,000 tons to 32,000 tons.

27. *Cashew-nut.*—Cashew-nut is another important dollar earner. The annual production is about 60,000 tons, the main producing areas being Madras and Travancore-Cochin. Although cashew-nuts are collected on a commercial scale in a few other countries, notably East Africa, the processing of cashew is practically the monopoly of India. In view of the growing competition for the processing of cashew-nuts there is great need for developing the production of cashew-nuts in this country. The Spices Enquiry Committee suggested that the cultivation of cashew-nuts should be undertaken on a plantation basis in the east coast districts of Madras, coastal districts of Konkan and certain other areas on the west coast. Plantations should be encouraged around processing factories. There is also scope for extending cashew-nut cultivation in Madhya Bharat, Mysore, Coorg, Andhra, Orissa, West Bengal and Andamans. It is proposed to increase the production of cashew-nut from 60,000 tons to 80,000 tons by the end of 1960-61.

28. *Tea, Coffee and Rubber.*—Production and other programmes for tea, coffee and rubber are at present being considered by the Plantations Enquiry Commission. Between 1950 and 1954 tea production has varied from 613 to 644 million pounds and exports from 427 to 470 million pounds. On the whole, it appears that it should be possible to achieve a production target of 700 million pounds and an export target of about 470 to 500 million pounds by the end of the plan. The Coffee Board is engaged in examining a fifteen year development plan for increasing the production of coffee, from 25,000 tons to 48,000 tons. Of the increase about 10,000 tons are proposed to be secured from intensive cultivation and rehabilitation of existing estates and 13,000 tons from reclamation and fresh plantings. A scheme drawn up by the Rubber Board for replanting 70,000 acres of area under rubber at the rate of 7,000 acres a year over a period of 10 years and for bringing 10,000 acres of new land under rubber at 2,000 acres a year is under the consideration of the Ministry of Commerce and Industry. For tea, coffee and rubber, firm development programmes have yet to be approved.

Development Programmes

29. It has been explained earlier that it is difficult to establish any precise correlation between the level of agricultural production and the extent of implementation of development programmes which are initiated under a plan. Such trends can be seen in perspective only after a period. It is even more difficult to attempt to relate the production of one set of crops such as foodgrains to developmental programmes which may be undertaken or to distinguish separately the influence which these programmes may have on the production of various groups of crops. Nevertheless, as in the first five year plan, an attempt has been made to examine the possible sources of increase in production potential, especially in the context of foodgrains. The increase of 10 million tons mentioned earlier is broadly ascribed to the following development programmes:

	(million tons)
Major irrigation	2·4
Minor irrigation	1·8
Fertilisers and manures	2·5
Improved seeds	1·0
Land reclamation and land development	0·8
General improvements in agricultural practices	1·5
Total	10·0

Although, over a series of years rough yardsticks for increase in food production arising from irrigation or the use of fertilisers or

other factors have been evolved, these are no more than a rough approach. Elaborate studies are needed before the effects of different programmes can be isolated and such measures devised as will permit reasonably accurate calculations even under normal weather conditions of anticipated increases in production. Programmes such as irrigation, fertilisers and improved agricultural practices have necessarily an interacting character and are inter-dependent. Moreover, as the farmer takes to improved agricultural practices and his knowledge of means available to him for influencing his environment increases and local communities become better organised for action the effects on production from areas already under irrigation are likely to be substantial.

30. During the second five year plan 21 million acres of land are expected to receive irrigation, 12 million acres from large and medium irrigation schemes and 9 million acres from minor irrigation works. The provision for minor irrigation is made in part in the agricultural programmes of States and in almost equal part in the national extension and community development programmes. The former includes also provision for about a million acres of land to be irrigated from State tubewell schemes. Over 3500 production tubewells are expected to be constructed in the various States. So far tubewells have been concentrated in the states of Uttar Pradesh, Bihar, Punjab and Pepsu. During the second Plan, the tubewell programme will be extended to new areas which are already being investigated for availability of underground water under an exploratory tubewell project. For the successful implementation of the minor irrigation programme it is essential that there should be close coordination in the States between the agricultural department and district development staff incharge of national extension and community projects. In each State and district the programme of minor irrigation works and the irrigation targets to be achieved should be drawn up jointly between these two agencies. Systematic surveys are needed with a view to locating suitable minor irrigation works. During the past decade in each area many works which were long thought to be necessary and feasible have been taken up and fresh investigations are now required. A survey of water resources in Madhya Pradesh, Hyderabad and the eastern parts of Bombay State which are liable to scarcity conditions has been recently initiated by the Ministry of Food and Agriculture. Another aspect which calls for renewed attention is that while new minor irrigation works are being constructed a proportion of old works are falling into disuse. It is suggested that State Governments should review existing arrangements for the maintenance of minor irrigation works and, where necessary, they should enact new legislation placing adequate responsibility on village communities so that, if there is failure in

maintaining works, repairs can be undertaken and the cost recovered from the communities concerned. Panchayat legislation in several States contains provisions for the levy of labour contributions. Such contributions should be utilised for the maintenance of local irrigation works.

31. The consumption of nitrogenous fertilisers is proposed to be raised during the second plan from 610,000 tons in 1955 to over 1·8 million tons. The consumption of phosphatic fertilisers is also proposed to be stepped up. The utilisation of sewage and town composts has been provided for in the plan. In all areas special attention should also be given to green manuring and the use of oil cakes and other manures. The procurement and distribution of chemical fertilisers on a greatly expanded scale during the second five year plan raises the question of strengthening the existing administrative arrangements both at the Centre and in the States. Since 1944 the Central Government have operated a trading scheme known as the central fertiliser pool. The work of the pool consists in ascertaining the requirements of States and of consumers such as tea and coffee plantations, procurement of the quantities needed, fixation of prices and making the necessary arrangement for the distribution of fertilisers. Distribution within States is undertaken by State Governments through Government sale depots, private distributing agencies and cooperative organisations, the detailed arrangements varying considerably in different States. As new chemical fertilisers are being brought into use and manurial trials are being carried out in the country, it is of the greatest importance that information regarding the use of fertilisers should be made available on the widest possible scale and cultivators should receive adequate guidance and assistance. The number of depots where fertilisers can be purchased needs to be considerably increased. It is also necessary that adequate buffer stocks should be maintained so that uninterrupted supplies are assured. Finally, cooperative societies should be increasingly used as the main agency for distribution at the village level.

32. Plans of States provide for about 3,000 seed multiplication farms with a total area of about 93,000 acres. In general every national extension service block will be served by a seed farm and a seed store. Seed produced at local farms will be issued to cultivators after passing through one or more stages of further multiplication at farms belonging to registered seed growers. The seed multiplication and distribution programme is to be developed so as to be able to meet the full requirements of national extension areas. Seed testing stations are also to be set up with a view to ensuring and enforcing quality standards for certain categories of seeds, especially for vegetable production. Programmes for setting up cooperative

seed stores have also been drawn up by several States. The area under the Japanese method of paddy cultivation is to be increased during the plan period from 1·6 to 4 million acres.

33. During the second plan it is proposed to reclaim 1·5 million acres of land and to carry out land improvement measures over an area of 2 million acres through the Central and State tractor organisations and other agencies and through manual labour of individual cultivators. According to the provisional programme which has been drawn up, the Central Tractor Organisation will undertake during the next two years the reclamation of about 96,000 acres of fallow and jungle land and the ploughing up of about 149,000 acres of land which has been previously cultivated. A tractor training centre has already been established in Bhopal and it is proposed to establish one more centre in order to provide opportunities for training for tractor mechanics and drivers. The plan provides for the establishment of a tractor testing station which will examine the suitability of all types of tractors under Indian conditions and will also test diesel engines and pumping sets.

34. In extension work in the States the contribution of dry farming techniques has not yet received sufficient attention. Despite the scale on which irrigation programmes are being undertaken, a large proportion of lands will continue to be rainfed. The importance of the widespread adoption of the best dry farming methods cannot therefore be too much stressed. In particular, both for the conservation of water and of soil, in extension and community project areas contour bunding should be specially encouraged. While in certain parts of the country it is necessary to provide for mechanical equipment, as a general rule, contour bunding can be undertaken by local labour with some assistance and guidance from trained agricultural personnel. The States of Bombay, Saurashtra, Hyderabad, Madhya Pradesh, Vindhya Pradesh, Bhopal and Uttar Pradesh have large scale programmes for contour bunding. Among themselves they aim at carrying out contour bunding operations on more than 1·5 million acres during the plan period.

In several States the value of consolidation of holdings in dry areas is not being fully appreciated. In areas where minor irrigation works such as wells can be undertaken, the benefits of consolidation of holdings are undoubtedly larger, but they are quite considerable even under dry farming conditions. The subject has been dealt with more fully in the Chapter on Land Reform and Agrarian Reorganisation.

35. In the field of plant protection government agencies have done valuable work especially in locust control. Greater attention should however be given to the education of the farmer in protecting his

centres according to a scheme sponsored under the Indo-US Technical Cooperation Programme will be extended to 16 more centres. A scheme for investigating the methods of control by hormonal weedicides, which was begun during the first Five Year Plan, will be extended. Four research-*cum*-testing centres for bullock drawn agricultural implements are to be established. To test the quality of improved seeds in regard to germination and extent of contamination by weed seeds, 11 testing centres are expected to be established. State Governments are to be assisted in strengthening their existing research laboratories and farms.

39. The Indian Agricultural Research Institute, the Central Potato Research Institute, the Central Rice Research Institute and the Sugarcane Breeding Institute have drawn up programmes of basic research for the Second Five Year Plan. During the first plan the Indian Agricultural Research Institute has carried out investigations on soil fertility, fertiliser use and wheat rust control, resulting in the evolution of varieties of wheat resistant to rust. Its research organisation and programme have been recently reviewed by an expert committee which has recommended strengthening of various departments. New lines of investigations such as soil mapping, rapid soil tests, testing and certification of insecticides, storage pests, appraisal of losses due to plant disease, and use of atomic energy in solving agricultural research problems are proposed to be undertaken. A new horticultural division is to be set up. The Institute's programme also includes the establishment of regional stations for virus research, a seed testing laboratory, and a bureau of plant introduction. The Institute has drawn up 68 research projects to be carried out during the Second Five Year Plan.

40. The Central Potato Research Institute, which undertook a coordinated scheme for applied research and development of potatoes during the First Five Year Plan, proposes to give special attention to the production and maintenance of disease-free nucleus seed stock of breeding material and improved varieties and to carry out investigations on tuber crops other than potatoes. The Central Rice Research Institute, which has been engaged in fundamental research work on rice and has been a coordinating centre of information proposes to establish sub-stations for breeding work on rice. Problems of sugarcane research are being studied under the aegis of the Indian Central Sugarcane Committee. The programme of research projects includes the study of varieties of sugarcane giving high tonnage and high sugar recovery, their response to fertilizers and manures with special reference to yield and quality of juice, time of harvesting of plant cane for keeping ratoons, cultural and rotational practices.

inheritance of disease resistance, influence of climatic conditions on insect pests like stem-borer and pyrilla, and research on improvement in the manufacture and storage of gur and improved types of cane crushers and juice boiling furnaces. A number of research projects are also being taken up at the Indian Institute of Sugarcane Research, the Indian Institute of Sugar Technology and the Sugarcane Breeding Institute.

41. Each of the seven Central Commodity Committees set up by the Government of India has drawn up a programme of investigations in the crops with which it is concerned. Thus, the Indian Central Cotton Committee, which has at present 72 research schemes under investigation, proposes to set up four regional research stations, to remodel the technological laboratory in Bombay and to intensify research work on long-staple cotton. The jute technological laboratory in Calcutta, which functions under the Indian Central Jute Committee, is to be developed and strengthened. An institute of oil technology is to be established by the Indian Central Oilseeds Committee which has evolved a few improved varieties of oilseeds and has proposed further work on the breeding of improved high yielding varieties. Research work on tobacco is to be stepped up by the Indian Central Tobacco Committee in view of the fact that with decline in the production of high grade tobacco in recent years exports of tobacco have diminished. Special emphasis is to be laid on improving the quality of tobacco and systematic trials of new varieties evolved at Rajamundry are to be carried out. The production of coconut being insufficient to meet the requirements of the country, the Indian Central Cocoanut Committee proposes to strengthen its two existing research stations and to organise three regional research stations, with the object of increasing the yield per tree by improving cultural practices, evolving high yielding varieties and reducing losses due to plant diseases and insect pests Research on arecanut, which is also in short supply, has to be undertaken as a long-range task as this is a perennial crop and takes 8 to 10 years to bear fruit. A central research station and three regional research stations have already been set up and under the auspices of the Indian Central Arecanut Committee it is proposed to establish a central technological laboratory and three more regional stations. The Lac Cess Committee will also intensify research work on the technology and utilisation of lac. Finally, in view of the programme for fruit and vegetable development during the second plan besides establishing a horticultural division at the Indian Agricultural Research Institute, it is proposed to set up horticultural Research stations on a regional basis for the improvement of important fruit crops such as mango, citrus, grape, guava, pineapple and apple.

42. In addition to technical research programmes described above the economic aspects of agriculture are now being studied at four agro-economic research centres which were set up in 1954-55 at Delhi, Santiniketan, Poona, and Madras. It is proposed to establish two more agro-economic centres during the plan period. Under the auspices of the Research Programmes Committee of the Planning Commission farm management studies are being conducted in Bombay, Punjab, West Bengal, Uttar Pradesh, Madhya Pradesh and Madras. Valuable data on the institutional aspects of agricultural development is becoming available from the work of the Programme Evaluation Organisation of the Planning Commission. With the help of these and other studies such as those undertaken by the Reserve Bank of India in the Rural Credit Survey studies it is hoped to fill important gaps in information concerning Indian agriculture, especially those relating to farm costs, economics of farm size, input and output relationships in agriculture, economic aspects of mixed farming, measurement of under-employment, credit needs, indebtedness, capital formation, etc.

43. With the decision to introduce the national extension service over the entire country, proposals to expand the available facilities for agricultural education were also considered. Bihar, Rajasthan and Travancore-Cochin were assisted in establishing new agricultural colleges. In Assam, Hyderabad, Madras, Madhya Pradesh and Punjab the existing agricultural colleges have been strengthened. Two new colleges are being established in Madhya Pradesh. The number of agricultural colleges has now risen to 28 and these institutions will be able to meet the total requirements of agricultural graduates during the second five year plan which are estimated to amount to 6,500. For the training of village level workers, in addition to the existing 54 basic agricultural schools and 44 extension centres, it is proposed to establish 25 new basic agricultural schools, 21 extension centres and 16 basic agricultural wings attached to extension training centres.

Marketing of Agricultural Products

44. The primary consideration for the development of agricultural marketing is so to reorganise the existing system as to secure for the farmer his due share of the price paid by the consumer and subserve the needs of planned development. To achieve these objects, malpractices associated with buying and selling of agricultural produce have to be eliminated, arrangements made for the efficient distribution of marketable surpluses from producing to consuming areas and co-operative marketing has to be developed to the maximum extent possible. Rural marketing and finance have

to be integrated through the development of marketing and processing on co-operative lines. Programmes for co-operative marketing and processing which have been drawn up so far for the second five year plan have been outlined in an earlier chapter. Here it is proposed to refer to other aspects of agricultural marketing. It is estimated that co-operative agencies may be able to handle about 10 per cent. of the marketable surplus by the end of the second plan. The rest of the surplus will continue to be sold through other marketing agencies. In the interest of the primary producer, therefore, the importance of regulating markets and market practices needs more emphasis. Moreover, the success of co-operative marketing itself depends on the efficiency with which regulated markets function. It has been observed that in States in which regulated markets have not been established to any extent, the cultivator is in a situation of much greater disadvantage than elsewhere.

45. The past few years have not been a period of marked progress in the regulation of agricultural markets. It had been recommended in the First Five Year Plan that the operation of the State Agricultural Produce (Markets) Act should be extended so as to cover all important markets before the end of the plan period. Before the plan seven States had this legislation in operation. During the plan only three more States have enacted legislation. The number of regulated markets which stood at 265 in 1950-51 has increased to over 450. In some of the States which have the necessary legislation trade in a number of important commodities is now being regulated, as for instance, in foodgrains, fruit and vegetables, cattle, etc. The practice of sales in villages is not free from abuse, but it has not yet been regulated to any extent. Municipal markets in towns, where the produce is received on consignment basis and also brought directly by the producers have so far remained generally outside the scope of the State Agricultural Produce (Markets) Act. Except in relation to proposals for co-operative marketing, plans of several States for the next five years do not provide adequately for the regulation of agricultural markets. Some States have, however, framed targets for this purpose. Those who have not done so should review the present position and draw up suitable programmes for regulating all important wholesale markets during the second plan. On the programmes so far drawn up it appears that the number of regulated markets will be doubled by the end of the second five year plan.

46. Although the Agricultural Produce (Grading and Marketing) Act was passed as long ago as 1937, except in respect of certain export commodities, progress in the grading of agricultural produce has not been adequate. The compulsory grading of sann hemp

and tobacco for export was introduced during the war. The First Five Year Plan recommended *introduction of compulsory grading* for export in respect of other commodities such as wool, bristles, goat hair, lac, sheep and goat skins, East Indian tanned leather, cashew-nuts, pepper and ginger, oilseeds, oils, essential oils and kapok. During the plan period there has been progress only in respect of wool and bristles and some essential oils, and preliminary work has been done for the remaining commodities. Compulsory grading should be organised at an early date for all the commodities mentioned in the First Five Year Plan.

47. Grading is necessary not only for commodities which are exported but also for internal trade. Hitherto it has been left to the goodwill of individual parties whether or not to seek Agmark grading for their products. In the main, grading has been confined to *ghee* and vegetable oils. Grading should be extended to other commodities as well as for *ghee* and oils. Laboratory facilities for testing quality and purity should be organised. A beginning has been made with the setting up of the Central Quality Control Laboratory at Nagpur and eight regional subsidiary quality control laboratories. It is expected that before the end of the second plan all these laboratories will be functioning. These laboratories, in addition to routine quality control work, will also undertake investigations for fixing or revising specifications of grades of different commodities. Grading of agricultural produce is also an essential aspect of the development of cooperative trade and warehousing. For the pooling of agricultural produce and bulk storage suitable grades have to be established for important cereals, oilseeds, pulses, cotton, jute, spices, etc. Some work has been done in this direction.

48. For inter-State trading and for widening the market for agricultural produce, it is essential that weights and measures and contracts of sale and purchase should be standardised. A large proportion of States have legislation for weights and measures, but some of them have not provided the machinery for supervision and inspection. The implementation of the weights and measures legislation has been suspended in view of the recent decision to change over to the metric system of weights and measures.

49. Variations exist in contract terms on the basis of which trading lakes place in different markets. For inter-State trade and for making the prices quoted in various markets comparable it is also desirable that contract terms, particularly in respect of such aspects as allowances for quality and packing should be standardised on an all-India basis. The Forward Markets (Regulation) Act, 1952, provides for prior approval of the Forward Markets Commission of bye-laws framed by various recognized trade associations. It is proposed

that these associations may adopt the standard contract terms devised by the Ministry of Food and Agriculture for wheat, linseed, groundnut, copra, and for oils prepared from these oilseeds. Standard contract terms should also be prepared for commodities in respect of which forward trading is to be regulated.

50. The lack of accurate and up-to-date market information places both the farmer and the administration at disadvantage. Failure in making market information promptly available is one of the factors accounting for price variations for the same commodity in different markets. In some markets the task of reporting devolves on private agencies and the arrangements made have not proved satisfactory. While information may be available on many matters from terminal markets, information from assembling and distributing centres is far from satisfactory. Commercial agencies engaged in export have information in respect of important markets, but the information received by them is not made public. The plan provides for the setting up of an all-India market news service mainly for farmers, to be organised in collaboration with the States. For providing trained personnel facilities for imparting specialized training in agricultural marketing to 20 to 30 candidates every year are also being arranged.

51. Market research comprising marketing surveys, studies and analysis of price spreads, standardisation of grade specifications and packages etc. is essential for the development of agricultural marketing. The Central Agricultural Marketing Organisation has so far undertaken marketing studies on about 40 principal commodities and published reports on them. The data contained in some of the reports are, however, largely out of date. There have been substantial changes in the pattern of agricultural production and in the composition of foreign and internal trade. It is therefore essential that fresh studies should be undertaken and the data brought up to date. For important crops regional studies should also be undertaken.

52. An important development during the first five year plan was the passing of the Forward Contracts (Regulation) Act, 1952, and the setting up in the following year of the Forward Markets Commission. The Commission advises Government on the associations which should be recognised for forward trading in different commodities and areas and the commodities in which forward market operations may be permitted under the Act. It regulates and controls the work of the approved associations, inspects their accounts and maintains a watch over the working of the various forward markets. Its activities are expected to go a long way in eliminating artificial scarcities and wide fluctuations in markets which have sometimes marked the working of commodity markets. During the past year the Central

Government have approved new centres for futures trading in a number of commodities—Akola and Indore for cotton; Bombay, Ahmedabad, Madras, Adoni, Delhi, Rajkot, Hyderabad and Calcutta for oilseeds and groundnut oil; Sangli for turmeric, Alleppy for coconut oil and Cochin for pepper. The Forward Markets Commission is at present engaged in considering applications for recognition received from associations at different centres and it is expected that about 40 associations will be recognised all over the country. Thereafter, the Commission's main task will be to keep the futures markets under observation and regulate their work so as to minimise price fluctuations between different places and between different points of time and to afford hedging facilities to traders.

Agricultural Statistics

53. The collection of accurate and reliable agricultural statistics, their analysis and interpretation on scientific lines are essential for the formulation of correct agricultural policies and for planning agricultural production. Attention to the inadequacy of such data and the need for their improvement was drawn in the First Five Year Plan. Since then various measures have been taken for improving agricultural statistics. The coverage of the crop forecasts has been enlarged and the time lag in their publication reduced. Cadastral surveys have been undertaken in more unsurveyed areas and primary reporting agencies have been set up where they did not exist. As a result of this, the reporting area for which returns of agricultural statistics exist has increased from 615 million acres at the beginning of the first plan to over 720 million acres. Standard definitions and uniform concepts have been laid down and a number of methodological studies have been undertaken by the Indian Council of Agricultural Research. Steps have been taken to improve the quality of the livestock census taken in April, 1956. Much, however, still remains to be done. Data relating to livestock numbers and livestock products and fisheries are inadequate and defective. Reliable statistics are not available for many minor crops of commercial importance. Provision has been made in the plan for improving the coverage, content and quality of agricultural statistics. Improvement in fisheries and livestock statistics will be made on the basis of pilot studies which have been completed.

CHAPTER XIV

ANIMAL HUSBANDRY AND FISHERIES

I

ANIMAL HUSBANDRY AND DAIRYING

INTRODUCTION

AT present only a fraction of the contribution which animal husbandry and dairying can make to the growth of the rural economy and to a rise in living standards is being realised.. In the Second Five Year Plan provision has been made for an outlay of over Rs. 56 crores on animal husbandry, including dairying, and it is expected that during the coming years greater progress will be made in this branch of agriculture than has been possible hitherto. The object of animal husbandry programmes is to increase the supply of milk, meat and eggs, a greater consumption of which is very essential in order to balance the present customary diets, and to provide efficient bullock power for agricultural operations in every part of the country. The quality of the cattle is thus of critical importance to the rural economy. There are also certain animal products such as wool, hair, hides and skins, etc., the efficient utilisation of which as industrial raw materials has a growing economic significance. Animal husbandry programmes, however, continue to encounter serious practical difficulties. Before solutions for them can be found, it is necessary that the size and the nature of the problem and its essential features should be widely understood.

2. According to the livestock census of 1951 the numbers of cattle in India were as follows:—

	(in millions)
Cattle :	
Breeding cows	46·34
Breeding bulls	0·65
Work stock :	
Male	58·41
Female	2·31
Young stock	43·49
Others	3·89
TOTAL	155·09

Buffalo:	
Breeding buffaloes	20·99
Breeding bulls	0·31
Work stock:	
Male	6·01
Female	0·53
Young stock	14·73
Others	0·78
TOTAL	43·35

Despite this large population, in 1950-51 the net value of live-stock products amounted only to Rs. 664 crores or about 16 per cent. of the income from agriculture. Studies indicate that the present cattle population is considerably in excess of the available supplies of fodder. It is commonly considered that in relation to the supplies of dry fodder at least one-third of the cattle population may be regarded as surplus and that in relation to the supplies of green fodder and concentrates the position is still worse. Owing to the increase in the requirements of food for the human population, areas, where grazing was possible, have steadily diminished. Large numbers lead to poor feeding and poor feeding comes in the way of attempts to raise productivity. There is thus a vicious circle which it is difficult to break.

3. Apart from by-products of agricultural crops, grazing areas have hitherto been the main-stay of cattle. Cattle raising has now to undergo a basic change, in that its future will lie more on a mixed farming system. Most of the fodder will have to be grown progressively on the holdings of the farmers. This aspect has to be kept in view in evolving suitable patterns for the reorganisation of agriculture.

4. Famines and epidemics having been largely brought under control, there is a tendency for the number of surplus cattle to increase even in the ordinary course and this trend will become more marked owing to action taken in recent years to place a total ban on the slaughter of cattle. Proposals for bans on the slaughter of cattle derive from a widely prevalent sentiment which has found expression in the Constitution and must inevitably also enter into national planning. Article 48 of the Constitution prescribes that the States shall endeavour to organise agriculture and animal husbandry on modern and scientific lines and shall, in particular, take steps for preserving and improving the breeds, and prohibiting the slaughter of cows and calves and other milch and draught cattle. But in giving effect to this Directive Principle care has to be taken to see that

conditions are not created which may defeat the very objective which the Constitution seeks to achieve.

5. An expert committee on the prevention of slaughter of cattle was appointed by the Government of India in 1954 to suggest measures to arrest the deterioration of cattle. The committee came to the conclusion that the present fodder and other resources of the country are grossly inadequate even for maintaining the existing cattle population. A complete ban on the slaughter of all cattle would tend to increase their number further and to jeopardise the well-being of the limited number of good cattle which the country possesses. It might also result in rapid increase in the numbers of wild cattle. The committee estimated that if slaughter of cattle were totally banned, the cattle population would increase at the rate of nearly six per cent per annum. Such trends were noted in 1953 in Uttar Pradesh by the Gosamvardhan Enquiry Committee which estimated that fodder and cattle feeding resources available in the State were sufficient only for about 58 per cent of the cattle population and that stray and wild animals were already causing damage to crops in several districts.

6. At the beginning of the First Five Year Plan it was felt that gosadans might offer a possible solution of the problem. Accordingly, the plan provided for the establishment in the first phase of 160 gosadans to serve a cattle population of 320,000. The scheme did not make satisfactory progress. Altogether, about 22 gosadans for 8,000 cattle have been established and many of these have found it difficult to secure the areas of land needed for their operations. During the second plan it is proposed to set up 60 gosadans for about 30,000 cattle. It is obvious that even if it were a question only of establishing gosadans for the care of unserviceable and unproductive cattle, it would be impossible to establish enough of them. The conclusion, therefore, is that in defining the scope of bans on the slaughter of cattle States should take a realistic view of the fodder resources available and the extent to which they can get the cooperation of voluntary organisations to bear the main responsibility for maintaining unserviceable and unproductive cattle with a measure of assistance from the Government and general support from the people.

7. During the Second Five Year Plan it is proposed to select 350 goshalas, out of a total number of 3,000, as centres to be developed for livestock improvement. These goshalas will send their unserviceable and unproductive cattle to the nearest gosadans. Each gosadan will have facilities for the better utilisation of hides, bones and other products. The proper utilisation of the products of dead animals has considerable economic significance and the All-India Khadi and

Village Industries Board has a number of programmes in this field. Each Goshala will be provided by Government with a certain number of animals of improved breed and will be required to secure an equal number from its own resources. Financial assistance will also be given. About Rs. 1 crore have ben provided for the scheme.

CATTLE BREEDING POLICY AND PROGRAMMES

8. There are as many as 25 well-defined breeds of cattle and six well-defined breeds of buffaloes in India. These are distributed in different parts of the country. High class specimens in each breed are limited in number and are found in the interior of the home of each breed. Around this home there are animals of the same type but of poorer quality. A few of these breeds are of the dairy type in which the females yield a large quantity of milk, while the males are poor for work. A large majority of the breeds are of the draught type; the cows are poor milkers but the bullocks are of high quality. In between, there are a number of breeds which may be called "dual-purpose" in the sense that the females yield more than an average quantity of milk, while the males are good working bullocks. These well-defined breeds are found in the dry parts of the country. Outside these areas, over large parts of the country in the east and the south of India where rainfall is very heavy, the cattle are non-descript and do not belong to any definite breed.

9. In order that best results may be obtained, an all-India breeding policy has been drawn up by the Indian Council of Agricultural Research and accepted by the Central and State Governments. This policy is briefly as under:

(a) In the case of well-defined milch breeds the milking capacity should be developed to the maximum by selective breeding and the male progeny should be used for the development of the non-descript cattle.

(b) In the case of well-defined draught breeds, the objective is to put as much milk in them as possible without materially impairing their quality for work.

Thus, the breeding policy is generally designed to increase the production of milk in the country without affecting the position in regard to the supply of bullocks required for cultivation. In every draught breed there is always a small number which give more than an average quantity of milk. By selecting bulls from this group the milk production of the population can then be progressively increased by further selection and breeding. When this is done in the interior of the breeding tracts, the bulls produced can be used in the outer areas in order that general improvement may be brought about in the entire population.

10. For the implementation of this policy each State has been divided into zones according to the breeds used in them. Thus, in the districts of Ahmedabad, Kaira, Broach and Surat, the breed that will be used is 'Kankrej'. In the western tracts of U.P. like Saharanpur, Muzaffarnagar, Aligarh, Mathura, etc., the breed that will be used is 'Hariana'. In the hilly tracts such as Dehra Dun, Garhwal, Almora and parts of Nainital, where the cattle are non-descript, Sindhi bulls will be used.

11. It is mainly through the key village scheme that the programme of livestock improvement is being pursued by State Governments. This scheme provides for concentrated work in selected areas. It envisages castration of scrub bulls, breeding operations controlled by artificial insemination centres (each of which is intended to serve about 5,000 cows of breeding age), rearing of calves on a subsidised basis, development of fodder resources and the marketing of animal husbandry products organised on co-operative lines. During the First Five Year Plan 600 key villages and 150 artificial insemination centres have been established. During the second plan 1258 key villages, 245 artificial insemination centres and 254 extension centres are to be set up. The programme is intended to produce about 22,000 improved stud bulls, 950,000 improved bullocks and a million improved cows. The scheme has made encouraging progress, but in respect of fodder development and the marketing of animal husbandry products not much headway has been made. On the other hand, controlled breeding has found a large measure of acceptance and States have enacted the necessary legislation for implementing the scheme. In the early stages work in many key villages and artificial insemination centres was delayed for want of equipment and shortage of staff, but everywhere the local people have been willing to provide rent-free buildings and contribute in other ways to make the scheme a success. During the second plan a great deal of attention must be given to the fodder programme as this is an essential basis for the programme of cattle development. In each area efforts should be made to develop the limited pasture lands which are available. With the large programme envisaged in the second plan a high degree of urgency attaches to the provision of adequate staff, to better administrative planning of supplies and to public education in matters affecting animal husbandry development.

Dairying and Milk Supply

12. Milk statistics in India are yet in the nature of broad estimates. It is reckoned that the total milk output of the country at the beginning of the First Five Year Plan was over 18 million tons. Of this, about 38 per cent is estimated as being used for consumption as fluid milk, about 42 per cent. for the ghee and the rest for khoa,

butter, curd and other products. Cows provide a little less than half and buffaloes a little more than half the total supply of milk. The average *per capita* consumption is estimated to be over 5 ozs. compared to about 15 ozs. which is recommended as the minimum quantity for balanced nutrition. Thus, an appreciable increase in the supply of milk is an imperative necessity. At this stage of development targets for the production of milk have to be drawn up on a regional basis with reference specially to the supply of milk for urban areas. So far a national production target for milk has not yet been formulated. It is proposed that local and regional targets should be set up in national extension and community projects and in other areas so that over the next five year period in these areas an increase of about 10 per cent in the total output of milk can be achieved. The general objective should be to achieve an increase of about 30 to 40 per cent in milk output over a period of 10 to 12 years in intensively worked areas.

13. The average production of milk of the better Indian breeds of cows and buffaloes is about 1500 lbs. per lactation, while the general average may not be much more than one-half of this amount. These figures are to be compared with the average production per lactation in western countries which ranges from 3000 to 4000 lbs. Where systematic breeding and management have been provided, as in well-organised dairy farms, even higher average figures have been obtained in India, but the number of cows and buffaloes involved is extremely small. Under suitable conditions the cow can produce as much milk as the buffalo. In order to encourage the breeding of high milk yielding animals, a scheme for the establishment of pedigree breeding stations will be operated in the Second Plan. This would help demonstrate to the farmer the benefit of using progeny tested sires for high milk production at a reduced cost. A factor which has injured milk production in the past is the trade in high quality milch cattle between well-known breeding areas and large cities like Bombay and Calcutta where it has been customary to dispose of animals when the dry period sets in. Programmes which are now being taken up for supplying milk to urban areas will make it possible to eliminate the harm done by such trade.

14. In recent years the supply of milk to urban areas has become an urgent problem for several reasons. Mushroom dairies set up in urban areas under unhygienic conditions are a danger to public health. Much of the milk sold in towns is adulterated and of poor quality. It is important to devise arrangements which will ensure the supply of adequate quantities of milk to urban areas (a) under conditions in which quality is guaranteed, and (b) at prices which are remunerative to the milk producer and fair to the consumer. With these objects in view, during the Second Five Year Plan, it is

proposed to organize 36 urban supply schemes, 12 co-operative creameries and 7 milk drying plants. The latter will be located in rural areas and will produce butter, ghee and skimmed milk powder. The general policy is that milk producers' co-operatives should be organised in villages to supply milk to the urban milk supply schemes, creameries and milk drying plants. The milk producers should be given assistance such as the payment of a remunerative price, the provision of bulls or artificial insemination, technical advice, facilities for improving production and storage of fodder and the provision of milking sheds. Milk collected from rural areas is to be distributed in urban areas under the control of appropriate authorities such as Milk Boards. In Bombay a large milk colony has been organised at Aarey and for Calcutta a similar colony is being established at Haringhatta. In these cities there were large concentrations of cattle which had to be removed out of the town. There was thus no alternative to the setting up of milk colonies. Large scale milk schemes are also proposed to be taken up in Delhi and Madras with the minimum size of cattle colonies in relation to their needs. Even where milk colonies are set up, they should be supplemented as in Bombay, by organised supply of milk from rural areas to the maximum extent possible. It is also proposed to promote the distribution of toned milk as a source of cheap supply in urban areas. Some of the existing dairies will also be expanded for handling larger supplies. The main problems in arranging for supplies of milk from rural areas are organisational and the programmes set out in the plans of States are to be regarded as the minimum to be achieved. There is no reason why, as these programmes begin to be carried out, similar programmes should not be worked out for other areas, especially where the necessary extension staff are available to take up the task of field organisation.

Control of Diseases

15. In the past rinderpest and other contagious diseases of cattle have taken a heavy toll, rinderpest alone accounting for about 60 per cent of cattle mortality. A pilot scheme undertaken during the first five year plan has made it possible to draw up a programme aiming at the eradication of rinderpest over the bulk of the country during the second plan. The plans of States also provide for measures to control other contagious diseases and pests, specially Foot and Mouth disease, Haemorrhagic Septicaemia, Black quarter and Anthrax. During the first five year plan the number of veterinary dispensaries was increased from 2,000 to 2,650. In the course of the second plan 1900 veterinary dispensaries are expected to be added and these are to include 145 mobile dispensaries.

SHEEP AND GOATS

16. It is estimated that there are about 38 million sheep in India producing 60 million pounds of wool per annum. About 24 million pounds of the indigenous raw wool is utilised in the country and the balance is exported. Finer varieties of wool are imported to the extent of about 11 million pounds per annum. The average yield of wool from indigenous sheep is estimated to be about 2 pounds per head. Improved varieties of sheep can yield about 6 pounds, so that there is considerable scope for development. The demand for wool comes from five main sources, namely, from cottage industries, for carpets and floor rugs, for blankets, for the manufacture of clothing material and knitting yarns in mills and for other industries like the manufacture of shawls, tweeds, etc. Imported wool is used mainly by mills.

17. Over many years studies have been undertaken in the cross-breeding of local types with the Merino sheep in Kashmir, Mysore and the Deccan, in the selective breeding of Bikaneri, Deccani and Bellary types and in the grading up of local inferior sheep with the Bikaneri. These have led to the adoption of a long-term approach which includes (a) selective breeding of indigenous breeds in the plains and where definite breeds exist, (b) upgrading of non-descript breeds with Bikaneri, and (c) cross-breeding with foreign breeds in selected hilly areas. Cross-breeding with Merino sheep has given valuable results both in respect of the quantity and the quality of wool produced. Encouraging results have also been obtained from selective breeding and from grading up local inferior sheep. As against the average yield of the Kashmiri breed of 16 ozs. of fleece, the yield of the half-bred variety is about 37 ozs. and in certain cases as much as 56 ozs. There is thus considerable scope for improving the present yields of wool.

18. During the second five year plan it is proposed to establish three new sheep breeding farms. These will be in Himachal Pradesh, Madhya Bharat and Saurashtra. The farms are intended to produce rams of good quality, both for pure breeding and for cross-breeding. At each farm a fleece testing laboratory and a wool utilisation centre will be set up. It is also proposed to establish 396 sheep and wool extension centres in different regions. The plan provides Rs. 1·5 crores for sheep and wool development. In many parts of the country, where scarcity conditions supervene from time to time, sheep farming is an industry which can do much to sustain the rural economy.

19. The goat is often described as the "poor man's cow", although only a fifth of the goat population of about 47 million is used for milk production. The average yield is extremely low, but selected

breeds have an average of about 400 pounds milk per lactation of 150 days. The goat has been a major factor in causing erosion and if it is to have a significant part in the agricultural economy, goat-breeding should be carried on under arable conditions. Closer studies of the economics of meat production under stall-fed conditions and of the special diseases of the goat are also needed.

POULTRY

20. The value of poultry as a subsidiary industry has long been recognised, but poultry development has taken place at a relatively slow rate. The average indigenous hen produces about 50 eggs per year in this country, as against 120 in many other countries. A factor in poultry development is the loss which the poultry breeder frequently suffers from the out-breaks of diseases such as Ranikhet, Fowl-ox and Spirochaetosis. Predatory animals and birds also take a large toll of village poultry. A proportion of the eggs produced during the hot weather are lost on account of the lack of proper preservation including cold storage.

21. During the second five year plan it is proposed to set up four regional farms, each with 2000 laying hens for acclimatising exotic breeds and from which foundation stocks will be distributed to 300 extension centres. Each extension centre is to comprise a demonstration unit with a development block attached to it. It is proposed to provide training to private poultry breeders in modern methods of poultry rearing on each of these demonstration units. A defertilization unit is also to be attached to each extension centre for processing village eggs in order to prolong their keeping qualities, especially during the summer months. In national extension and community project areas vaccination of poultry against various diseases is already being undertaken on an increasing scale. Experiments have shown that White Leghorns and Rhode Island Reds are the most useful breeds for crossing or upgrading the indigenous stock. It is considered that with the measures which are being planned it should be possible to increase the production of upgraded indigenous hens by about 50 percent. There is considerable room for the development of poultry as a subsidiary industry in every village in the country, provided improved stocks are made available in adequate numbers, elementary guidance is freely extended and satisfactory marketing and other facilities are organised. By the end of the second plan the per capita availability of eggs per annum would be raised from four to twenty.

Research and Education

22. The contribution which livestock can make to public health and to the economy of the country can be greatly increased by improvements brought about through judicious breeding, proper feeding, adequate protection against losses from diseases and other causes and improvement in the general conditions of husbandry and management. Programmes for development have to be based on extensive scientific research. During the first five year plan, apart from research schemes sponsored by the Indian Council of Agricultural Research, veterinary research and animal husbandry in general did not receive sufficient attention. The second five year plan, however, provides for much larger programmes for the development of animal husbandry and the expansion of reasearch facilities. Animal husbandry research has to be organised at three levels, namely, national, regional and State. At the national level Central institutes like the Indian Veterinary Research Institute and the National Dairy Research Institute will be mainly responsible for fundamental work on problems of all-India importance, development and standardisation of new techniques (including biological products), institution of specialised post-graduate courses, etc. Under the second five year plan these institutes will be strengthened and expanded. At the Indian Veterinary Research Institute the existing research divisions for animal genetics, poultry, animal nutrition, pathology, bacteriology, parasitology and biological products are being given larger staff and equipment and a biological products standardisation division is also being added for regulating and controlling the quality and use of vaccines and sera prepared at different centres. The National Dairy Research Institute which has been established at Karnal and takes the place of the Indian Dairy Research Institute at Bangalore will have separate divisions for research in dairy husbandry, nutrition, chemistry, bacteriology, technology and machinery, besides a division for dairy extension work and a dairy science college. A regional station of the Institute is being maintained at Bangalore for the purpose of training students in junior courses in dairying and for research.

23. Animal husbandry conditions vary considerably in different parts of the country and there are many research problems which are of importance to particular regions and are best studied in regional institutions. The Government of India, therefore, propose to develop four research institutes, one in each of the four regions in which the country has been divided for animal husbandry research and development, namely, temperate (Himalayan), dry (northern), eastern and southern regions. A beginning in this direction was made in the first five year plan by the Indian Council

of Agricultural Research which undertook to finance the establishment of four regional stations for research in animal nutrition problems. During the first plan special staff was also appointed for carrying out research in infertility in cattle and for training veterinary college students in animal gynaecology and obstetrics and the allied subjects of artificial insemination and physiology and pathology of reproduction. During the second plan further additions will be made to the staff.

24. In most States nucleus centres for veterinary research have already come into existence—thanks to the work of the Indian Council of Agricultural Research, and State Governments have also provided in their plans for the further strengthening of their existing organisations. It is important that the results of research carried out at the Central and regional institutes should be applied and adapted to local conditions. Work at research stations in the States is likely, however, to come up against shortage of adequately trained and experienced personnel.

25. Programmes for key villages in national extension and other areas, rinderpest eradication and urban and rural milk supply schemes which have been drawn up for the second five year plan require altogether about 5000 veterinary graduates as against 2750 likely to become available from existing institutions. The shortage of trained veterinary personnel was already anticipated two years ago and certain steps were taken. Double shifts were introduced in five veterinary colleges at Hissar, Hyderabad, Patna, Bombay and Bikaner and four new colleges were set up in Madhya Bharat, Orissa, Andhra and Travancore-Cochin. Existing veterinary colleges are also being assisted in increasing their admissions and improving their training facilities. A post-graduate veterinary college is being set up at Izatnagar at the Indian Veterinary Research Institute. Since the veterinary degree course extends over four years, to meet shortages in the intervening period an emergency course of two years' duration has been started at ten centres, each admitting about 100 students. Trainees from these centres will as an emergency measure supplement supply from veterinary colleges. State Governments are taking steps to meet the requirements of stockmen and other subordinate personnel like compounders and dressers. In a number of States special training courses in subjects such as artificial insemination, poultry husbandry and flaying and utilisation of carcasses have been instituted. The Government of India also propose to institute a course of training in the husbandry and diseases of pigs.

26. To provide about 1000 personnel for dairying it is proposed to set up a dairy science college at Karnal along with the National

Dairy Research Institute. At present training facilities in dairy science do not go beyond the diploma level. A number of specialised short-term courses of training in different fields of dairying are also to be organised at Karnal and Bangalore, at the milk colonies of Aarey and Haringhatta and at the Agricultural Institute, Allahabad during the second five year plan. With a view to harnessing the resources of these institutions for the development of cattle wealth the Central Gosamvardhana Council has instituted a twelve-month course for training goshala workers for appointment in the more important go-shalas.

II

DEVELOPMENT OF FISHERIES

27. In recent years efforts have been made to increase the production both of fresh water fish and of sea fish. Progress in this field has received an impetus both from the initiative of the Central and State Governments and from the technical and other assistance received under the Indo-U.S. technical co-operation programme, the Indo-Norwegian Fisheries Community Development programme and from the Food and Agricultural Organisation. As against a provision of Rs. 5 crores in the first five year plan the second plan envisages a total outlay of about Rs. 12 crores—about Rs. 4 crores on the part of the Ministry of Food and Agriculture and about Rs. 8 crores in the plans of States.

28. Fishery statistics, which were in an unsatisfactory state at the beginning of the first five year plan, have improved, to some extent, and the Ministry of Food and Agriculture propose to take steps to arrange for better statistical information regarding the production, supply and marketing of fish. While statistics of fish production are still far from adequate, it is estimated that at the beginning of the first five year plan the total production was about a million metric tons, of which about 20 per cent was accounted for by production for domestic use and the balance represented sea fish and the marketable surplus of inland fish. During the first plan, it is estimated that fish production has increased by about 10 per cent, the production in 1955-56 being about 1·1 million metric tons. During the second plan it is expected that fish production will rise by about 33 per cent *i.e.* to about 1·4 million metric tons. The present *per capita* consumption of fish is slightly less than 4 lbs. per annum. A 50 per cent increase in fish production over a period of about 10 years is a task within the bounds of practical accomplishment.

Inland Fisheries

29. The development of inland fisheries was begun on a small scale even before the first five year plan, but has since been intensified. In West Bengal, during the first five year plan, 2500 acres of semi-derelict tanks, 378 acres of under-developed beels and about 13,500 acres of smaller collections of water have been brought under fish culture. In Orissa, large swampy areas have been reclaimed and utilised for fish culture. Special emphasis has been placed on increasing the availability of fish seed. Nearly 2600 lakhs of spawn and fry were collected in 1954-55. It has also been possible to materially reduce the rate of mortality of fry and fingerlings in nursery and rearing ponds and during transport. Some States have undertaken legislation for bringing neglected waters under fish culture. Surveys of waters are also being undertaken, for instance, in 1954-55 about 25,000 acres of water area was surveyed in different States and an additional area of more than 9,000 acres was stocked. The development of fisheries in large reservoirs has also been taken in hand. The Mettur reservoir in Madras has been developed and can now produce about 5 tons of fish per day. Similar work has been initiated or is being planned for a number of other reservoirs. The plans of States provide about Rs. 5 crores for the further development of inland fisheries.

Marine Fisheries

30. While the development of inland fisheries is important, the greater part of the programme of fisheries development relates necessarily to marine fisheries. The problems of fishermen have to be understood and solved in the context of the environment in which they live. Technological developments and research have a vital contribution to make in this field, but the central emphasis should be on the fisherman himself, the means at his disposal, the local community to which he belongs and the manner in which his work is to be further reorganised and developed. Community development among fishermen presents special problems of extension, organisation and technical development. It is from this aspect that the Indo-Norwegian fisheries project in Travancore-Cochin has a larger significance than the immediate tasks undertaken may suggest. Increasingly, the emphasis in the development of fisheries should be on a coordinated approach to the social and economic life of villages and groups of villages whose main source of livelihood is fishing.

31. These villages are engaged in producing fish for the market, so that their economy is largely bound up with arrangements for

the collection, transport and marketing of fish. Here the central fact of the situation is that the vast majority of fishermen are dependent on middlemen for meeting their domestic needs and securing their production requisites. Frequently, they are in debt and have to pledge their catch in advance. This leads to low productivity and to hand-to-mouth existence for most fishermen, besides exposing them to constant exploitation. Difficult as it may be, in the main, it is along cooperative lines that the production of sea fish and the reorganisation needed among fishing communities has to be undertaken. During the first five year plan useful beginnings have been made. About 800 fishermen's co-operative societies have been organised. Most of them are concerned with credit, but a number also provide facilities for purchase of requisites and some undertake cooperative production and marketing. In Bombay cooperative societies of fishermen have made encouraging progress. These societies are supported by a central cooperative organisation which markets, on an average, fish to the value of about Rs. 8 lakhs per annum and, with assistance from the Government, have taken steps to provide boats, engines and ice and cold storage plants. Madras has 236 societies and, while most of them provide credit, some have also organised supplies of foodgrains, yarn, sail cloth, fishing hooks, etc. In Orissa fishermen's cooperatives market fish of the value of about Rs. 32 lakhs per annum and arrange for the supply of fishermens' requirements. Cooperative marketing has also been developed in fishing villages in Saurashtra.

32. In the development of sea fisheries, the tasks to be undertaken fall broadly under four categories: (1) improvement of fishing methods, (2) development of deep sea fishing (3) the provision of fishing harbours, and (4) the organisation of fish transport, storage, marketing and utilisation of fish. With the craft now in use, the activities of fishermen are confined largely to a coastal belt of about 7 to 10 miles, so that fish resources further away or in deeper waters are exploited only to a very limited extent. For increasing production in off-shore waters, mechanisation of fishing craft and improved fishing methods are essential. During the past four years in Bombay about 600 boats have been 'motorised' and the supply of fish to the city of Bombay has increased four-fold-from 10,000 tons to 40,000 tons per annum. In Saurashtra more than 40 boats have been fitted with inboard engines, in addition to the use of outboard motors in some boats. In some maritime States, with the assistance of foreign experts, designs of existing boats are being modified and new designs are being studied. The second five year plan provides for the expansion of existing activities relating to mechanisation and development of improved fishing methods.

33. The Central Deep Sea Fishing Station at Bombay has undertaken exploratory fishing operations for charting fishing grounds, assessing the suitability of different kinds of craft and gear under Indian conditions, determining fishing seasons and training of personnel. Areas off the coast of Bombay and Saurashtra within the 40 fathom line have been charted to a considerable extent and some valuable fishing grounds have been located. Various methods of fishing are being tried out by a fleet of seven vessels. Similar work has been undertaken in the Bay of Bengal by the West Bengal Government, and in Madras, Travancore-Cochin and Saurashtra also experimental fishing with different kinds of boats and gear has been in progress. The activities of the Deep Sea Fishing Station at Bombay are to be extended and the charting of fishing grounds beyond the 40 fathom line undertaken during the second five year plan. Exploratory fishing and charting of fishing grounds have also to be carried out further south, on the west coast and on the east coast. Three exploratory fishing stations are to be established at Cochin, Visakhapatnam and Port Blair.

34. With the expansion of off-shore and mechanised fishing programmes, it is necessary to improve harbour facilities for fishing vessels. New harbours and berthing facilities at existing harbours have to be developed. The various problems which arise in this field are being studied with the assistance of the experts from the Food and Agricultural Organisation. Plans of the maritime States provide for the expansion of fishing harbour facilities.

35. Although in some areas, especially on the west coast, there is a plentiful supply of fish, transport and cold storage facilities have been inadequate, leading to insufficient and irregular distribution in inland areas. Plans of States have stressed improvement in transport facilities. In Bombay, already more than 60 trucks and 30 carrier launches are being used for bringing fish to town. Road transport is also being developed. The Central Government propose to procure 20 refrigerated railway wagons for long distance transport. For sending fish spawn and fry from Calcutta to deficit areas, air transport is also being used to some extent. In view of the importance of ice and cold storage facilities, the Central Government have established a plant at Bombay, the Madras Government have set up two plants at Kozikode and Mangalore, and under the Indo-Norwegian programme an ice plant is being erected in Travancore-Cochin. A number of small ice and cold-storage plants received under the Indo-U.S. Technical Cooperation programme are being erected at important fishing centres and some of these will be operated by cooperatives.

36. In many places fish markets are controlled by middlemen or by combinations of businessmen, so that the fisherman gets a low price for his produce and the consumer pays a high price for what he buys. Some areas have a considerable surplus to sell as, for instance, Saurashtra, which can export nearly 90 per cent of the total fish catch and the Chilka Lake area in Orissa. On account of inadequate transport facilities much of the fish goes to curing yards to be processed and marketed as dried fish. Plans of States provide for the better organisation of curing and marketing of dried fish. At present about 27,000 tons of fish products, consisting mostly of dried, dry-salted and wet-salted fish, are exported to neighbouring countries. Some of the trash fish, not being fit for consumption, is processed as fish-meal and fish manure and in a few States shark liver oil is also manufactured. Small quantities of shark liver oil are exported and steps are being taken to utilise sea-weeds on a cottage industry basis for the manufacture of agar agar, jelly, algine, cattle feed and manure. The development of a fisheries bye-products industry has considerable scope and should be undertaken as part of the work of multipurpose cooperative societies serving fishing villages.

Research and Training

37. In the second five year plan considerable importance has been attached to the development of research. A beginning in this direction was made before the first five year plan with the setting up by the Central Government in 1947 of two fisheries research stations, one at Mandapam for marine fisheries and the other at Calcutta for fresh and brackish water fisheries. The Central Marine Fisheries Research Station, which has sub-stations at Bombay, Karwar, Calicut, Cochin and Madras, undertake research on problems of marine fisheries, including estimation of fishery resources, the rate of present exploitation, the possibilities of increasing production and utilisation and measures of conservation. The economic and technical problems of commercial fisheries like mackerel, sardine and prawns, trawl fisheries, development of saline coastal tracts into fish farms, utilisation of sea weed, etc., have been specially studied. Investigations have indicated several directions in which the management and conservation measures could be developed for fishing and allied operations.

38. Problems of inland fisheries are being investigated at the Central Inland Fisheries Research Station, Barrackpore (Calcutta) and its three sub-stations. Investigations are carried out at Allahabad on riverine and lacustrine fisheries, at Cuttack on pond fisheries and at Calcutta on estuarine fisheries. Studies have been carried out

for the development of techniques for reduction in the mortality of fry and fingerlings in the early stages of fish culture and transport and progress has been made in the improvement and standardization of fish cultural practices. Programmes of investigation have been drawn up for the second five year plan with particular reference to estuarine fisheries, brackish water fish farming, fisheries in natural and artificial lakes, and fisheries in the large river systems, effects of pollution on fisheries and control of weeds. Local problems are being studied in several States and the Indian Council of Agricultural Research also sponsors special schemes. Research work in fisheries was reviewed by a committee set up in 1954 which also advised on the expansion programmes of the Central stations. The fisheries research programmes of the Central Fisheries Research Stations, of fisheries departments in the States and of universities are being coordinated with the assistance of a Standing Fisheries Research Committee. It is proposed to establish a fisheries technological station to undertake investigations on designs of fishing nets and other gear, material for manufacture and preservation of nets and gear, storage of fish in fresh, chilled and frozen conditions, processing and utilisation of fish and other marine products and the establishment of commodity standards and grades for marketing and expansion.

39. Training facilities for the staff of fisheries departments and for research workers are provided at the Central Inland Fisheries Research Station at Calcutta. Training in powered fishing is imparted on the vessels of the Central Deep Sea Fishing Station in Bombay and those of the West Bengal Government in Calcutta. These facilities are to be extended under the second five year plan. The training of fishermen is as important as the training of technicians and research workers. Along with the Governments of Bombay and Saurashtra the Central Government have set up a training centre for fishermen in mechanised fishing at Satpati near Bombay, and similar centres are to be established at Tuticorin and Cochin. Training in mechanised fishing is also being given in Travancore-Cochin at the Indo-Norwegian project. There are also facilities for short refresher courses at the two Central Research Stations for senior officers of the State Governments.

40. Useful experience has been gained during the past few years. Problems connected with the provision of facilities and the organisation of extension work among fishermen, need to be studied more closely, so that during the second five year plan a large programme of cooperative development can be undertaken among fishermen in the maritime States.

CHAPTER XV

FORESTS AND SOIL CONSERVATION

I

FORESTS

The forests of India are the source of many kinds of timber with varied technical properties, which subserve the requirements of the building industry, of defence and communications as well as of an expanding range of industries in which wood forms the principal raw material. Forests are also the source of urban firewood and of small timber required by rural communities. They provide grazing, hay and fodder. Apart from these direct benefits, forests perform a vital function in protecting the soil on sloping lands from accelerated erosion by water and on flat lands from desiccation and wind erosion. In the catchments of the rivers, they serve to moderate floods and to maintain stream flow. They have an important ameliorating influence on the factors of the climate. These protective benefits are fully realised when forests extend over sizeable tracts, but even scattered trees and clumps of tree growth exercise a beneficial influence. Properly disposed shelter belts and wind belts serve to increase agricultural yields to a marked extent. Finally, forests are the home of our rich and varied wild life. Their destruction directly spells the destruction of wild life.

2. These are familiar facts, but they emphasise the compelling need for retaining an adequate proportion of the land surface under permanent forests which are properly distributed and assured of freedom from encroachment, abuse and over-use. In India forests account for 22 per cent of the total land surface. As a percentage this would not appear to be an unsatisfactory figure, but actually the timber value of the areas classed as forests falls far short of their potential, which is itself substantially below the yield per acre of forests in Western countries. A considerable proportion of Indian forests are such only in name and are subject to various forms of maltreatment. The proportion of forest land varies from about 11 per cent in the north-west to about 44 per cent in the central region. Thus the forests, such as they are, are unevenly distributed. Forests are most scarce in the areas where they are most needed as, for example, in the densely populated and intensively cultivated Gangetic basin. Over most of the country the forests are of a tropical character, being naturally somewhat open in the drier region and

being everywhere composed of a large variety of species of which only a few have an economic value. Thus, an acre of forest land even in the valuable mixed moist deciduous forest yields less utilizable timber than an acre of forest in the purer European forests. Some improvement in this matter can be effected (and indeed has been effected) by finding uses for secondary timbers through research and by avoiding waste in extraction. In advanced countries, such as the U.S.A. and U.S.S.R. the area under forest is often about a third of the total land area. Having regard to these considerations, especially the lower productive capacity of the natural tropical forests, the National Forest Policy Resolution of 1952 proposed that the area under forests should be raised steadily to 33 per cent of the total area, the proportion to be aimed at being 60 per cent in hilly regions and 20 per cent in the plains.

3. It is well to remember that every advance in industrialization will be reflected in an increased demand on the produce of the forest. Several industries will make use of wood directly as a material, but even where this is not the case, timber will be needed not only initially in the construction of factories but also regularly for the packaging of the manufactured products. The forests will have to provide cellulosic raw materials in increasing measure for the production of paper needed for educational and other programmes. It is not an accident that the most advanced countries in the world are precisely those with the highest per capita consumption of wood. India's per capita consumption of round wood is 1·4 cft. as compared with 58 cft. in the U.S.A. The consumption of pulp products is 1·6 lbs. as against 78 lbs. in the U.K. The per capita forest area is 1·8 and 3·5 hectares in the U.S.A. and U.S.S.R. respectively, while in India the figure is 0·2 hectare. These figures indicate the leeway that has to be made up in order to attain a comparable standard of living.

4. Forest policy has to be directed, on the one hand, to securing the long-range development of forest resources and, on the other, to meeting the increasing demands for timber in the immediate future. In both directions it is necessary to plan realistically. Reference has already been made to the disadvantages arising from the mixed character of the tropical forests, with the valuable species forming a mere sprinkling in them. This causes serious difficulties in the effective regeneration and management of the mixed forests. In the case of teak, these difficulties could not be overcome in many areas except by resort to clear-felling and artificial regeneration in compact areas. A similar solution will have to be found for the production of wood required for industrial purposes; ready availability of wood for industrial purposes in adequate quantities and at reasonable cost

is a *sine qua non* for successful timber-based industries. A pronounced trend towards artificial regeneration of industrial (and commercial species) will therefore be inevitable in the future management of our forests. The dangers and difficulties implicit in such a course are fully realized and it should be the task of intensified silvicultural research to overcome the difficulties and ward off the dangers.

5. The extension of the area under forests and their transformation so as to increase their yield potential will necessarily take a long time. It is therefore essential to resort to short-term measures which will not at the same time injure the prospects of long-term development. Measures should be taken to "upgrade" inferior or secondary timbers. The strength and durability of these timbers can be improved by known techniques of plywood manufacture, seasoning, preservative treatment, lamination, and timber engineering. Ornamental timbers can be made to go a longer way by being used as face veneers. Chip-boards and hard-boards made out of inferior timbers or wood waste will help to meet the timber deficit. Improved methods of timber extraction will help to cut costs and reduce waste.

6. The main principles governing the management of forest resources and their continued development were also laid down by the Forest Policy Resolution, 1952. The Resolution stressed the need for:—

(1) evolving a system of balanced and complementary land-use, under which each type of land is allotted to that form of use under which it would produce most and deteriorate least;

(2) checking—

(a) Denudation in mountainous regions on which depends the perennial water supply of the river systems whose basins constitute the fertile core of the country;

(b) the erosion progressing apace along the tree-less banks of the great rivers leading to ravine formation, and on vast stretches of undulating waste-lands depriving the adjoining fields of their fertility;

(c) the invasion of sea-sands on coastal tracts, and the shifting of sand dunes, more particularly in Rajputana deserts;

(3) establishing tree lands, wherever possible, for the amelioration of physical and climatic conditions and promoting the general well-being of the people;

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(4) ensuring progressively increasing supplies of grazing, small wood for agricultural implements, and in particular, of firewood to release the cattle-dung for manure to step up food production;

(5) sustained supply of timber and other forest produce required for defence, communications and industry; and

(6) the realisation of the maximum annual revenue in perpetuity consistent with the fulfilment of the needs enumerated above.

In order to implement these directives and develop the country's forest resources effectively and usefully, measures will be necessary

(i) to extend and improve areas under forests;

(ii) to meet the increased demand for timber and forest produce in the immediate future; and

(iii) to plan for the long-range development of forest resources.

Progress during the First Plan

7. The first five year plan provided Rs. 9·6 crores for forest development. During the first plan period, State Governments carried out a number of schemes relating to afforestation, development of forest communications, strengthening of forest administration and formation of village and small-scale plantations. On an area exceeding 75,000 acres, the vegetative cover was restored by afforestation or planting. Over 3000 miles of forest roads were constructed or improved. A considerable area (over 20 million acres) of forest land under private ownership or management was brought under State control, and the administrative set-up was strengthened to deal with this additional responsibility. The preparation of working plans was speeded up and additional areas were brought under new working plans.

8. The Central Government sponsored a scheme for matchwood plantations and towards the end of the plan period, such plantations were being raised in the States at the rate of about 3000 acres per year. The principal schemes of the Central Government related to Forest Research, Forestry Education and the Preservation of wild Life. New fields of investigation in forest research included studies in the introduction of Malayan cane into India, protection of timbers against marine organisms, preservative treatment of green bamboos, etc. Work was initiated in revising and bringing up to date important and standard works connected with forestry and forest utilisation. Additional accommodation and equipment have been provided at Dehra Dun to meet the increased requirements of forest education. The Indian Board for Wild Life was constituted in 1952 and has done useful work in the cause of preservation of wild life in the country. Preliminary steps have also been taken towards the establishment of a modern Zoological-cum-Botanical Park in Delhi.

Forest Programmes for the Second Plan

9. Besides continuing, wherever necessary, work on the schemes initiated during the first five year plan the programme of second plan will include proposals or measures for—

(i) afforestation and improvement of poorer areas in the forests and extension forestry,

(ii) formation of plantations of species of commercial and industrial value,

(iii) promotion of methods for increased production and availability of timber and other forest produce in the immediate future,

(iv) conservation of wild life,

(v) amelioration of the conditions of staff and labour in the forests,

(vi) increased tempo of forest research,

(vii) increased provision of technical personnel, and

(viii) central co-ordination and guidance in the implementation of forest development schemes all over the country.

Forest programmes have been drawn up by different States on a fairly uniform and systematic basis consistent with local requirements. The total provision for forest development in the second plan is about Rs. 27 crores. The Central Government will pay special attention to research, education, demonstration and co-ordination, and the States will carry out the forest development projects.

10. As has been stated earlier a large area of degraded forests has come under State control. Frequently these forest lands are not demarcated on the ground or indicated on maps. These extensive areas have to be defined on the ground and suitably notified under Forest Act as early as possible if they are to be saved from further indiscriminate cutting and denudation. The first task of State Forest Departments will therefore be to undertake surveys of such areas, with a view to arranging for their better management. At the same time, many of these degraded or derelict areas are urgently in need of rehabilitation. The restoration of a tree cover or even any form of vegetation may prove extremely difficult and expensive. These areas are unlikely to result in a productive forest crop in the near future, and yet, in the interests of securing their protective functions the rehabilitation of as many of these areas as possible must receive urgent attention. It is proposed to tackle about 3,80,000 acres in this manner; this will augment the effective forest area of the country.

11. Further, since it may prove extremely difficult to secure land under other use (especially in thickly populated areas) for increasing the extent of forests, measures of extension forestry are to be encouraged to a considerable extent. Plantations will be formed along canal banks, in roadside avenues, in the form of shelter belts and on village waste lands. It is visualised that many of these plantations will prove productive in the long run.

12. Under existing forest working plans, Forest Departments have been forming timber plantations only on a limited scale and not all the areas suitable for such plantations have been tackled. There is much scope for increased work along these lines. Extensive areas could be profitably put under such plantations, especially as it is clear that the country's needs for timber and other forest products already exceed production levels and are likely to increase further. About 50,000 acres of forest land will be planted anew with commercially important species like teak. Matchwood plantations will be formed on a larger scale than during the first five year plan and it is proposed that about 50,000 acres will be added to such plantations during the next five years. Progress at this rate for a further period of five years may lead to self-sufficiency with regard to this requirement when the plantations begin to mature. A further 13,000 acres will be planted with species like Wattle and Bluegum of value to the tanning, paper and rayon industries. Plantations of baib grass, suitable for paper making, are also planned.

13. The schemes described above are in the nature of long-term measures of forest improvement. Short-term measures which would help to increase output in the immediate future will include better techniques for timber extraction, the development of forest communications and the increased use of preservative and seasoning processes besides the use of plywood, composite wood, chip-boards, etc. The plan provides for adoption of improved "logging" methods particularly with reference to the use of efficient tools for felling and extraction. The adoption of simple wire ropes for extraction in hilly areas and other similar inexpensive measures will help in the utilisation of resources in relatively less accessible areas to a greater extent than previously. Such improved operations may prove of special value in the hill forests of Punjab, Himachal Pradesh, Jammu and Kashmir, Uttar Pradesh, West Bengal and parts of Bihar, Madras and Mysore. Along with improved logging, attention will also have to be given to large-scale development of forest communications. Under the plan it is proposed to construct or improve 7,400 miles of forest roads. Side by side with the increased production of commercially valuable timbers effective use of all timbers readily available in the forest should be made. It is known that India's forests include a variety of secondary timbers

which can supplement the commercial timbers if properly seasoned and rendered durable by preservative treatment. The plan therefore provides for the establishment of three or four demonstration timber treating and seasoning plants by the Centre and also some 10 small-scale treating and seasoning plants in the States with a view to upgrading secondary timbers and utilising them fully.

14. Much difficulty has been felt in planning and development of forest resources due to lack of basic statistical information regarding such resources in the country. Resources surveys, particularly a timber trends survey, are to be undertaken (in conjunction with the Food and Agriculture Organisation) for the study of timber production including utilisation and end-uses as of also future trends in consumption. The latter will help in the future planning of production.

15. India's forests are known to be rich in their content of minor forest produce such as bamboo, cane, resin yielding trees, plants yielding essential oils, medicinal plants, grasses, etc. While such well known items as bamboos and lac are being cultivated or reared and utilised on a fairly satisfactory scale, better methods of rearing, collection, extraction and marketing should be possible with a view to ensuring quality as well as regular and adequate supplies of all minor forest produce. In the case of some items such as medicinal plants, intensive cultivation under controlled conditions (in plantations) needs to be developed as speedily as possible. It is proposed to put about 2000 acres of land under such plantations during the second plan. Improvement of pastures and forest grazing also will receive attention and about 5 lakhs acres are likely to be dealt with in the period.

16. The conservation of wild life is an integral part of forest management, especially in view of the imperative need for protecting India's rich heritage of wild life, which is now finding its last refuge within the limits of the reserved forests of the country. Such notable animals as the lion and the rhinoceros are in danger of extinction. In order to serve the cause of wild life, forestry programmes in the second plan include the establishment of 18 national parks and game sanctuaries, besides a modern zoological park in Delhi.

17. The conditions of working and living in or near forests involve unusual forms of hardship and the amelioration of the working conditions of staff and labour in the forests calls for special consideration. The provision of facilities by way of accommodation, drinking water supplies, medical assistance, schooling, etc. will therefore receive the attention of State Forest Departments. In order to strengthen the economy of comparatively backward, tribal forest workers, forest labour co-operative may be established

on an increasing scale for working forest produce (based on the experience gained in this field in Bombay), so that profits which now go to contractors should accrue to forest labourers. Care should, however, be taken to see that these cooperatives do not fall into the hands of individuals who may exploit the tribal people. Forest Departments should therefore give close and sympathetic guidance in the working of co-operatives.

18. Development work on the scale proposed necessarily calls for an increased tempo of forest research. The research programme initiated during the first five year plan at the Forest Research Institute, Dehra Dun will be further expanded during the second plan and will include, besides studies in logging methods, timber engineering, plant introduction and genetical research as also problems connected with timber utilisation in industries. A regional research station in two sections will be established in the South. Units to investigate biological and silvicultural problems will be located in conjunction with the Southern Forest Ranger, College at Coimbatore and units dealing with forest products research will be established at Bangalore, utilising the Mysore Government's Forest Research Laboratory as a nucleus. States will also undertake research schemes relating to local and regional problems, particularly in the field of silviculture.

19. The requirements of forest personnel during the second five year plan have been worked out. About 250 forest officers are required as against the normal likely output of the Forest College, Dehra Dun of about 150. It is therefore proposed to increase annual admissions from 40 to 80. The number of Forest Rangers required is estimated to be about 700 compared to the present output capacity of 600 from the colleges at Dehra Dun and Coimbatore. The number of admissions at Coimbatore is proposed to be raised by 40. About 2000 foresters will be needed for implementing the various programmes included in the second five year plan, and arrangements for training them are being made locally or in different regions. The requirements of research personnel (other than those trained in forestry) will be met by recruitment from other sources.

20. It is recognised that in order to achieve well-planned development of forest resources all over the country, coordination of the activities of the States and the Centre is desirable. The Central Board of Forestry concerns itself with the various problems arising in India's forests and provides overall guidance. It is necessary that development work as well as working plan preparation and forest management should be coordinated on a comprehensive scale under a continuing whole-time organisation. It is therefore essential to set up and maintain a well organised service for technical advice

and assistance at the Centre. Such an Organisation could also make itself responsible for improved forest statistics, market studies and statistical information, for the standardisation of grading work with reference to timber and other forest produce and for the technical efficiency of all forestry practices in the country. It is therefore proposed to set up a Forestry Commission for coordination of forest development and management.

II
SOIL CONSERVATION

21. Large areas of land have gone out of productive use because of wind and water erosion and this process is continuously at work. Surveys of areas which have been damaged by or are suffering from soil erosion are available only for some parts of the country. In fact, a high proportion of agricultural lands under cultivation suffer from soil erosion of one kind or another. Deserts which cover about 50 million acres are in the grip of erosion themselves and produce conditions conducive to erosion in adjacent areas. It is estimated that one-fifth of the area in hilly regions, pastures, waste lands and ravines are in an advanced state of erosion. Excessive deforestation, overstocking of grazing lands and the practice of unsuitable methods of agriculture have been important factors contributing to erosion.

22. During the first five year plan soil conservation work was begun on systematic lines. About 250 agricultural and forest officials have been trained in soil conservation methods. A desert afforestation research station was set up at Jodhpur in 1952 and five regional research-cum-training centres were established in the latter half of the first plan period. Eleven pilot projects have been taken up in the States of Bombay, Andhra, Orissa, West Bengal, Madras, Punjab, Saurashtra, Travancore-Cochin, Ajmer, Kutch and Manipur. The pilot projects located in Madras and Travancore-Cochin have now been converted into development projects. Demonstrations of soil conservation practices under expert guidance have been carried out in these pilot projects and in areas such as the Damodar Valley and in Keleghai and Darjeeling in West Bengal, in the Machkund area, in the Bundhelkhand region and the Jumna ravines in Uttar Pradesh and in the Nilgiris in Madras. In the Araku valley, a project which was intended to improve the economic conditions of the tribal people by demonstrating the use of terracing, contour bunding, etc. has been taken up. In the planning and execution of the demonstration programmes, local farmers have been generally associated. A reconnaissance survey covering the Upper Teesta river valley has been carried out and suitable control measures proposed. This survey illustrated the urgent need for soil conservation measures in the upper reaches of all river valleys. In the Bhakra catchment area,

afforestation for soil conservation has been in progress since 1951-52 and 4382 acres of trenching and check damming and 5124 acres of afforestation have been undertaken. Soil conservation practices such as contour bunding, contour trenching, gully plugging, terracing, check damming, training of streams and ravines, etc. which have been undertaken in the States during the first plan cover a total area of about 700,000 acres of which Bombay alone accounts for more than two-thirds.

23. During the first plan problems connected with the immobilisation of the Rajasthan desert have been studied in detail. A Desert Afforestation and Research Station has been established at Jodhpur. Trees have been planted over 150 miles of the roads in western Rajasthan. A total area of about 100 square miles is being demarcated for pasture improvement and experimental plantations.

Programmes for the Second Plan

24. Soil conservation work will be undertaken during the second plan in a concentrated manner over 3 million acres in those tracts which are seriously affected by soil erosion. The programmes drawn up for these areas will attempt to tackle erosion problems of all kinds—for agricultural lands, deserts and coastal sand dunes, river valley projects, hill regions, ravine lands, waste lands and lands eroded by sea. A provision of Rs. 20 crores has been made in the plan for soil conservation.

25. *Agricultural lands.*—Sloping and undulating lands which are under cultivation have specially suffered from sheet and gully erosion. A recent erosion survey of areas in Bombay which are exposed to scarcity conditions has shown that more than two-thirds of cultivated area has been severely eroded, and about one-fourth of the land has been rendered useless for agricultural purposes. Similar conditions exist in parts of Madras, Mysore, Hyderabad, Andhra, Orissa, Madhya Pradesh, Madhya Bharat, Bhopal and Saurashtra. Soil conservation measures such as contour cultivation, strip cropping, mulch farming, bunding, terracing, gully plugging, check damming etc. carried out in a planned manner can do much to arrest deterioration of land and, in due course, restore its productivity. Such measures are to be undertaken over about 2 million acres of agricultural lands during the second plan period.

26. *Deserts and coastal sand dunes.*—Due to pressure of population, both human and cattle, in desert areas in Kutch and in parts of Rajasthan vegetation has been fast diminishing. This leads to further desert formation and affects the fertility of agricultural

lands in U.P., the Punjab and in other parts of Rajasthan. In addition there are local sand dunes and coastal sand dunes which also require to be controlled. Measures for the control of shifting sands and sand dunes, such as the creation of nucleus centres for the spread of vegetation, the introduction of improved dry farming practices and animal husbandry, improvement of pastures by seeding, fencing and rotational grazing, afforestation and village plantations for fuel and fodder, will be undertaken over an area of about 350,000 acres.

27. *River valleys.*—The practice of shifting cultivation has impaired forest wealth in Chhotanagpur, Orissa, Assam, and the Nilgiris which form the catchment areas of important river valley projects. Soil conservation in the upper reaches of river valleys is essential for preventing silting in dams and rivers. Soil conservation measures such as afforestation, fire control in forests and wastelands, pasture management, contour bunding, contour cultivation and strip cropping, gully control, stream-bank erosion control, head water dams and bench terraces will be undertaken during the second plan over about an area of 330,000 acres.

28. *Hilly regions.*—Due to pressure of population and overgrazing, specially by goats, steep slopes in the foot hills of the Himalayas from Punjab to Assam, in the Nilgiris, in the Eastern and Western Ghats, and in other hilly areas are being gradually deforested. Forests in the village common lands of the Siwalik hills in Punjab, Pepsu and Himachal Pradesh have suffered over a long period. From these bare and barren hills sand has been carried down by hill torrents into the plains below and has buried or destroyed thousands of acres of valuable agricultural land. In the Assam hills, large tracts have been laid bare by shifting cultivation. In the Nilgiris, forests on steep slopes have been cut down to make room for potato cultivation which has caused serious denudation. In Travancore-Cochin certain hill forests have been recently cleared for growing tapioca. Such practices result in soil erosion and land slides and are likely to affect dams, channels and river beds. In hilly regions, soil conservation measures over an area of about 170,000 acres are to be undertaken during the second plan period.

29. *Ravine lands.*—Lands situated along rivers such as the Jamuna, the Chambal, the Sabarmati, the Mahe and their distributaries are being eroded steadily and are going out of cultivation. It is necessary to reclaim such lands by afforestation, check dams, and terraces and other soil conservation measures in the watersheds of these rivers. Large-scale bunding operations for holding rain water are also needed. It it proposed to take soil conservation measures in ravine lands over an area of about 150,000 acres.

30. *Waste lands.*—There are large tracts of waste lands which are at present under active erosion due to misuse. This is seen, for instance, from the naked roots of trees and shrubs often found on waste lands. Some of these lands should be afforested to supply fuel and fodder and the rest put under improved pastures. During the plan period, soil conservation measures in waste lands are to be taken up over an area of about 100,000 acres.

31. *Sea-eroded lands.*—Mention may also be made here of a scheme which though not part of the soil conservation programme proper will help protect coastal areas in Travancore-Cochin. Portions of the coastal area of this State are subjected to sea-floods periodically, which causes soil erosion. It is proposed to take protective measures at points which are damaged by such floods. The programme for the second plan covers about 45 miles of the coast. Work on the construction of a long sea-wall parallel to the coast with groynes 200 ft. long at 660 ft. Intervals has been begun.

32. *Soil Conservation Boards.*—As recommended in the First Five Year Plan, a Central Soil Conservation Board was set up in 1953 for organising a national soil conservation programme. Soil conservation boards have been set up in almost all the States. The functions of the Central Soil Conservation Board include the coordination of research, arrangements for technical training, organisation of collaboration between the States and the Centre and technical and financial assistance for projects undertaken in States and in river valley areas.

33. *Soil Conservation Legislation.*—In the First Five Year Plan it was recommended that suitable legislation should be undertaken by States for soil conservation. The object of such legislation should be to provide for (a) power to execute specified improvements and to allocate the cost between farmers and the State Government, (b) constitution of cooperative organisations of farmers for soil conservation work, and (c) powers to restrict uses and practices in certain areas which could be declared "protective areas". A few States like Bombay, Uttar Pradesh and Saurashtra already have legislation for soil conservation and few other States have had legislation under consideration. The Central Soil Conservation Board has carried out a study of the legislation on soil conservation already in force or under consideration in different States and has circulated a model soil conservation bill for the use of States. The model bill provides for the preparation and execution of land improvement schemes, including schemes for conservation and improvement of soil resources, prevention or mitigation of soil erosion, protection of land against damage by floods or drought, reclamation of waste lands, payment of compensation to farmers, recovery of Government dues, etc.

34. *Soil Conservation Research and Surveys.*—Extension work in soil conservation has to be based on investigations under different conditions of soil and climate. The Government of India have set up six research-cum-training centres in soil conservation at the following places:—

(1) Dehra Dun—for studying problems of afforestation and soil conservation in the Siwalik hills and submountainous districts with a sub-station at Chandigarh for training of *chos* (hills torrents);

(2) Kotah—with a sub-centre at Agra for reclamation and soil conservation in the chambal and the Jamuna ravines;

(3) Vasad (North Gujrat)—for soil conservation measures in the deep ravines in the lower reaches of the catchments of rivers;

(4) Bellary—for soil conservation problems in the black soil region;

(5) Ootacamund—for use of bench terraces for saving the soil for potato cultivation in the Nilgiris and other hill regions;

(6) Jodhpur—for afforestation in the Rajasthan desert and improvement of pasture and grazing lands in Rajasthan for cattle breeding and sheep management.

Some States have also established research stations, such as those at Sholapur in Bombay, at Sahibnagar in Hyderabad, at Rehmankhera in Uttar Pradesh and at Rajgangpur in Orissa.

35. These research stations are engaged in developing effective practices acceptable to farmers and conforming to the required technical standards necessary. The desert afforestation research station at Jodhpur has undertaken investigations on silviculture of indigenous species, possibilities of introducing exotic arid zone species, and hydrological conditions, rainfall, wind velocities and other relevant factors. The station maintains a seed store for the distribution of seeds of suitable species. It also demonstrates various methods of desert control such as vegetation around tahsil offices and police stations, shelter belts along selected roads and railway lines running across the directions of the winds, and organization of forest plantations on different types of sand to evolve the best methods of afforesting the region. Under the second plan the Central Soil Conservation Board will extend the activities of this station for developing forest plantations and pastures with a view to the stabilisation of the desert.

36. For the planning of soil conservation measures reconnaissance surveys on a regional basis are required. These will provide

essential data regarding the present land use patterns, soil characteristics, degree of erosion, climatic conditions, etc. On the basis of the surveys suitable programmes can be formulated. A provision of Rs. 65 lakhs has been made in the second plan for surveying, classifying and mapping out about 10 million acres of land in areas which present special problems.

37. Programmes to be undertaken during the second plan are estimated to require about 4000 persons of different grades of expertise. In view of the shortage of trained personnel available at present, training centres have been established by the Government of India at the research stations at Dehra Dun, Kotah, Vasad, Bellary and Ooctacamund. Training facilities are also available at the Hazaribagh soil conservation research station of the Damodar Valley Corporation. In addition to these facilities, U.P., Bombay and Saurashtra have established their own training centres at Rehman Khera, Sholapur and Morvi respectively. A number of pilot project demonstration centres are to be established in different parts of the country for giving demonstrations of soil conservation practices to farmers.

38. Simultaneously, with research on technical aspects of soil conservation it is necessary to pay attention to the human problems involved in conservation and to develop methods, procedures and institutions through which knowledge of conservation practices is carried to the rural people and they can be assisted to carry out such practices. Execution of programmes of erosion control such as discontinuance of shifting cultivation and of current grazing practices would in many cases, entail large changes in the rural economy and in the way of life. The people have therefore to adapt themselves to the new conditions. Erosion control programmes should therefore be accompanied by appropriate programmes of education and re-settlement. Where the people concerned are tribal people as in the case of shifting cultivators, an understanding of their social and economic organisation is essential as their rehabilitation has to be undertaken in groups and the existing forms of group organisation and leadership have to be utilised.

39. All these measures for education and active assistance for rehabilitation and re-settlement of people can be best undertaken through the agency of the national extension service. Similarly, conservation measures on cultivated lands have to be organised primarily through the extension agency. The importance of soil conservation measures for the work of the extension agency will be apparent from the fact that these measures offer the most hopeful method of raising agricultural productivity in 50 to 60 per cent of the cultivated area of the country, which will not come under

irrigation. For conservation measures on the lands of cultivators, the extension agency has to provide technical guidance and supervision and financial assistance, mainly in the form of loans. For soil conservation measures which are of collective benefit to a community such as control of erosion in the village common lands, raising of a fuel and fodder reserve for the village, etc., community effort has to be organised with the help of the best local leadership. Local institutions have to be developed so that the people can themselves undertake responsibility for these programmes. As proposed in an earlier chapter, village panchayats should become responsible for soil conservation measures and for ensuring minimum standards of land management by individual cultivators. They should also receive such technical and financial assistance as may be needed.

CHAPTER XVI

AGRICULTURAL WORKERS

APPROACH TO THE PROBLEM

IN the First Five Year Plan an account was given of the magnitude of the problem of agricultural workers as revealed by the population census of 1951 and the approach to the problem in relation to the rest of the plan was briefly explained. Reference was also made to certain measures which were contemplated in the interest of landless workers such as the fixation of minimum wages, the allotment of house sites, the formation of labour cooperatives and resettlement schemes for landless workers. During the past three or four years the problem of landless workers and their place in the economy has drawn wider attention. At the same time, in implementing the proposals which were made in the First Five Year Plan, the intrinsic difficulties of the problem have come to be perhaps better appreciated.

2. When the First Five Year Plan was presented the only data available were those provided by the population census in 1951. These showed that out of a total rural population of 295 million, 249 million were engaged in agriculture and, of these about 20 per cent. were returned as cultivating labourers and their dependents. Cultivating labourers represented a total population of about 49 million. States in the eastern and southern parts of the country, which together have an agricultural population of 117 million, accounted for about 27 million or 55 per cent. of the total population of cultivating labourers. More recently the results of the Agricultural Labour Enquiry which was carried out during 1950-51 have become available in a series of reports. The extent of the problem is indicated in a more comprehensive manner by this enquiry than by the general census of population. In determining the size of a problem the definitions adopted are of considerable significance. For the purposes of the population census, a cultivator was distinguished from a "cultivating labourer" as a person who took the "responsible decisions which constitute the direction of the processes of cultivation". Broadly, all cultivating labourers were employees of cultivators. In rural life many individuals, whether farmers or artisans or labourers, have to eke out their existence by doing work of more than one kind and a person may be both a cultivator and a labourer or both an artisan and a labourer, doing what comes his way at a given time in the year. From this aspect the definition of agricultural labourer adopted in

the Agricultural Labour Enquiry, although not without its difficulties, is likely to reflect the actual situation more closely. According to this definition an agricultural labourer was a person who, for more than half of the total number of days on which he actually worked during the year, worked as an agricultural labourer.

3. On this definition the Agricultural Labour Enquiry revealed that about 30·4 per cent. of rural families were agricultural labourers, half of them being without land, and the rest being in possession of some land. As will be seen from the statement given below, in some States agricultural workers represent a serious problem, notably, in Bihar, Orissa, Madras, Mysore, Travancore-Cochin, Hyderabad, Madhya Bharat and Madhya Pradesh.

Census zones and major States	Density of Population	Percentage of rural to total population	Percentage of agricultural labour in rural population		
			Total	With land	Without land
1	2	3	4	5	6
All India*	312	88·7	30·4	15·2	15·2
North India	557	86·3	14·3	5·7	8·6
Uttar Pradesh	557	86·3	14·3	5·7	8·6
East India	344	90·0	32·7	19·0	13·7
Assam	106	95·0	10·7	6·7	4·0
Bihar	572	93·1	39·9	25·6	14·3
Orissa	244	95·9	43·0	23·8	19·2
West Bengal	806	75·0	23·8	10·5	13·3
South India	450	80·0	50·1	27·3	22·8
Madras	446	80·0	53·0	28·3	24·7
Mysore	308	76·0	42·0	27·4	14·6
Travancore-Cochin	1015	84·0	39·5	20·8	18·7
West India	272	65·0	20·4	8·8	11·6
Bombay	323	69·0	20·4	9·6	10·8
Saurashtra	193	66·3	20·0	2·2	17·8
Central India	181	80·0	36·7	14·6	22·1
Madhya Pradesh	163	86·5	40·1	14·9	25·2
Madhya Bharat	171	81·9	19·9	7·5	12·4
Hyderabad	227	81·0	42·1	19·5	22·6
North West India	123	80·0	9·0	2·7	7·1
Rajasthan	117	83·0	9·3	3·7	5·6
Punjab	338	81·0	10·1	1·6	8·5
PEPSU	347	81·0	13·2	0·6	12·6
Jammu & Kashmir	522	89·0	3·4	2·7	0·7

*Including Jammu & Kashmir.

4. As many as 85 per cent. of agricultural labourers had only casual work, mostly in connection with harvesting, weeding, preparation of soil and ploughing. The average annual income per family from all sources was Rs. 487 and the average income *per capita* was Rs. 104 compared to the national average in the same

year of Rs. 265. The extent of employment varied under different conditions in various parts of the country, the average being 218 days in the year, 189 days in agricultural work and 29 days in non-agricultural work. Thus, it might be said that there was work for wages for about seven months in the year, total unemployment for rather more than three months and some kind of self-employment for less than 2 months. About 15 per cent. of agricultural workers were "attached" to landowners and worked for them on the average for 326 days. Compared to "attached" agricultural workers, casual labourers had work only for 200 days in the year. "Want of work" was given by casual workers as the reason for being unemployed for more than 74 per cent. of the days on which they had nothing to do. Some 16 per cent. of agricultural workers had no wage earning employment at all during the year.

5. Apart from the results of the Agricultural Labour Enquiry precise data regarding rural unemployment and under-employment are not yet available. Such studies as have been made, however, leave no room for doubt that agricultural workers constitute a vast and complex problem which has far-reaching implications not only for the rural economy but also in relation to the entire process of economic and social development as it may be visualised over a period of 15 to 20 years. In this perspective among aspects to be kept in view are the following :—

(i) In rural areas there is no sharp distinction between unemployment and under-employment. On the basis of data in the Agricultural Labour Enquiry it is estimated that 2·8 million agricultural workers may be totally unemployed in rural areas. A number of other estimates have also been made, although the definitions adopted by them vary a great deal. There appears to be an agreement on the broad conclusion that under existing conditions, with present techniques of agriculture being continued, if cultivating units were to approach what might be described as family holdings affording possibility of fairly full-time work in agriculture for a family of average size, agricultural production could be maintained with about 65 to 75 per cent. of the number of workers now engaged in it. In other words, on certain assumptions, one-fourth to one-third of the existing labour force in agriculture may be surplus to its requirements. During the harvesting season of course, as in every country, labour requirements are larger.

(ii) The growth of population has greatly accentuated the problem of agricultural workers. In a recent study an attempt has been made to compare occupational data for different censuses. There are difficult questions of procedure and definition to be resolved. Nevertheless the data available provide some broad indications. In the course of 50 years, from 1901 to 1951, the total working force increased by about 25 million from 117 to 142 million. The working force in agriculture increased by almost identical amount from 73 to 98 million while the working force in non-agricultural occupations stood at about the same figure as at the beginning of the century. Thus, increase of non-agricultural employment in urban areas has been counterbalanced in almost equal degree by decrease in rural areas. Whereas, at the beginning of the century, 62·5 per cent. of the working force was engaged in agriculture, by 1951 the proportion stood at about 70 per cent. Thus, the general trend until very recently appears to have been in the direction of increased dependence on agriculture. In relation to agricultural workers developments of the past few decades including growth of population, development of modern industry and trade and the increasing disintegration of the traditional economic basis of rural life all converge at the two principal points—place in the social structure and employment opportunity. Step by step the social handicaps from which agricultural workers belonging to scheduled castes and other backward classes suffer have diminished or are diminishing rapidly. The economic problem of finding adequate work opportunities has, however, become more intense. This is the situation as much for the bulk of the farmers as for the bulk of agricultural labourers although it is true that a much higher proportion among agricultural labourers have income and consumption standards at levels below the national average.

6. In the main, it is against the background of these basic features of the economic situation that measures for rehabilitating agricultural workers have to be devised. Feudal rights, maldistribution in the ownership of land, exploitative wage rates and social disabilities of all kinds have doubtless to be eliminated, and progress in these directions is already being made. These aspects of the problem are considered in the chapters relating to land reform and agrarian reorganisation and the welfare of

backward classes. The pattern of village development envisaged for the future clearly assumes that the distinction within the village community between those who have land and those who are landless must disappear and that there should be equality of status and opportunity. The correct distinction then will be between workers with varying skills who may be engaged in different occupations, both agricultural and non-agricultural. It is also agreed that in implementing schemes of rural development the first concern should be to ensure that the under-privileged and the lower income groups receive the maximum benefit. The imposition of ceilings on agricultural holdings and the development through cooperative management of land and other resources of the village in the interest of the entire community are accepted policies. To an extent, when the proportion of agricultural workers who own some land increases, certain benefits in terms of social status and economic opportunity will no doubt accrue. At the same time, the data obtained during the Agricultural Labour Enquiry showed that although 50 per cent of agricultural labourers have holdings of nearly three acres per family, differences in standards of consumption between those agricultural labour families who have land and those who do not have land are not so marked. The conclusion suggested is that while redistribution of land in favour of the landless has an essential role in the process of social and economic change, its effects in terms of higher living standards and fuller employment are limited. The problem, therefore, is—

(i) to bring about large increases in agricultural production including animal husbandry, horticulture, etc.;

(ii) to expand work opportunities within the rural economy specially through intensive development of village and small industries and agricultural processing;

(iii) through a measure of redistribution of land and provision for educational facilities and concessions, to raise their social status and enable them to develop greater confidence, initiative and ability to avail of economic opportunities; and

(iv) to improve the living conditions of agricultural workers.

7. The total working force is expected to increase by 19 million between 1951—61 and 23 million between 1961—71, that is, by 42 million over a period of 20 years or by 33 million during the next three plan periods. If the economy develops at the sort of rates indicated in Chapter I, it is reckoned that the proportion of the labour force engaged in agricultural occupations 20 years hence may be about 60 per cent. in place of the present proportion of 70 per cent. At this point the problem of the agricultural worker merges

with the wider problem of the rate and pattern of growth of the national economy as a whole, a subject which has already been considered earlier in this report.

PROGRAMMES

8. Once the structural relations in economic life begin to be transformed and the process goes forward with speed, the welfare and interests of all sections of the community become inter-related and inter-dependent. In other words, increase in agricultural production, expansion of economic opportunities, redistribution of land and the provision of social amenities for agricultural workers are seen as aspects of an integrated approach to the basic problems of poverty. Necessarily for a considerable time, weaker sections of the community, such as agricultural workers, must have special consideration and the plan should provide for programmes which will benefit them in special measure. Thus, the development of more intensive and diversified agricultural production and of a more diversified occupational structure in rural areas will increase the volume of rural employment and bring increasing opportunities to agricultural workers. In national extension and community project areas the organisation of programmes designed to assist the weaker sections of the community, especially small farmers, landless tenants, agricultural labourers and artisans, has been given a high priority during the second five year plan. For village and small industries the plan provides Rs. 200 crores. For the welfare of backward classes Rs. 90 crores have been provided. The programme for the expansion of education and health will bring strength to agricultural workers and other weaker sections in the community and enable them to take fuller advantage of new opportunities as they arise. In each area a conscious effort should be made to see that having regard to numbers, the resources provided under the plan are devoted to the welfare of agricultural workers and other under-privileged sections in reasonable proportion. In the main, this objective has to be achieved by formulating detailed schemes with special reference to local conditions and needs. At the same time, measures such as resettlement schemes, formation of labour co-operatives, the allotment of house sites and the enforcement of minimum wages should receive special attention.

9. During the first plan a provision of Rs. 1·5 crores was made for schemes for the resettlement of landless labourers. A number of schemes have been in operation such as land colonisation schemes in Madras and Andhra, schemes for settling Harijans on land in a number of States and the setting up of a farm of 10,000 acres in Bhopal by the Central Government for which landless labourers

were selected with a view eventually to their settlement as owners of land. In the second five year plan, apart from a provision at the Centre, 14 States have schemes estimated to cost about Rs. 5 crores for the settlement of about 20,000 families of landless workers on 100,000 acres of land.

10. With the imposition of ceilings some land will become available for resettlement. It has been proposed in the chapter on Land Reform and Agrarian Reorganisation that in each State after data relating to the census of land holdings and cultivation have been studied and the areas likely to become available assessed, detailed schemes for the resettlement on land of landless workers should be drawn up. To the extent they are made available, Bhoodan lands should also be brought into the scheme for resettlement on surplus lands. It has of course to be recognised that since, on lands which become available, tenants ousted on account of resumption for personal cultivation and persons with uneconomic holdings have also to be provided, the areas available are bound to be somewhat limited. It has been pointed that while special personnel for organising the resettlement of landless workers will be required, the resources needed for development should be provided from agriculture, national extension and community development, village industry and other programmes for which provision exists in the plan. The setting up of Boards, including non-official members, have been recommended at national and State levels, for advising on schemes for the rehabilitation of landless workers and reviewing progress from time to time has been recommended. These Boards should consider the problems of rehabilitation of agricultural workers from all aspects, including resettlement on land.

11. A considerable proportion of the outlay under the second five year plan will be on construction works, both large and small. It has been recommended that to the greatest extent possible labour and construction cooperatives rather than contractors should be utilised. Extension personnel should regard the organisation of such cooperatives as a special responsibility. In each development block of Taluka there should be a labour cooperative union to which labour cooperative societies in individual villages are affiliated. In the case of medium and large projects the block or taluka union should be assisted in obtaining assignments of work on standard terms and, in turn, it should mobilise local labour from the villages. For smaller schemes village labour cooperatives could be given contracts directly and helped in executing them. The development of labour and construction cooperatives can be of material assistance in increasing work opportunities in rural areas and increasing the incomes of landless workers. Given the necessary organisation, there is no

reason why in a fairly short period strong labour cooperative unions possessing their own tools, equipment and even transport cannot be brought into existence. In the initial stages, besides technical guidance and help in management, loans for acquiring tools and other essential equipment should be given to taluka or block labour cooperative unions. In this connection it may be mentioned that the experience gained in the working of forest labour cooperatives has been encouraging.

12. In several States laws or regulations have been enacted for providing house sites in villages to agricultural workers. It should be the responsibility of the village community as a whole to provide plots of land for house construction to landless agricultural workers. In some cases a measure af assistance in the construction of cheap houses with local materials may also be feasible. House sites for agricultural workers should be made available free of cost.

13. During the first five year plan minimum wages have been fixed over their entire territories in the States of Punjab, Rajasthan, Ajmer, Coorg, Delhi, Himachal Pradesh, Kutch and Tripura. In Assam, Bihar, Bombay, Uttar Pradesh, West Bengal, Mysore and Vindhya Pradesh minimum wages have been fixed for certain specified areas which represented low-wage pockets. In a number of other States minimum wage legislation has not yet been implemented. It is realised that under existing conditions pressure of population on land and abundance of the supply of labour, enforcement of minimum wages presents difficult problems. Nevertheless, the ultimate effect of legislation relating to minimum wages is to improve wage levels in rural areas. It is, therefore, recommened that minimum wages should be prescribed in all States and for all areas and, despite the limitations, a steady effort should be made to enforce the wage rates which are fixed.

14. Steps are being taken to work out at regular intervals consumer price indices for agricultural workers. These indices will facilitate fixation and revision of minimum wages from time to time. A scheme has also been included in the plan for repeating the Agricultural Labour Enquiry with a view to evaluating the effect of the first five year plan on the conditions of Agricultural labour.

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